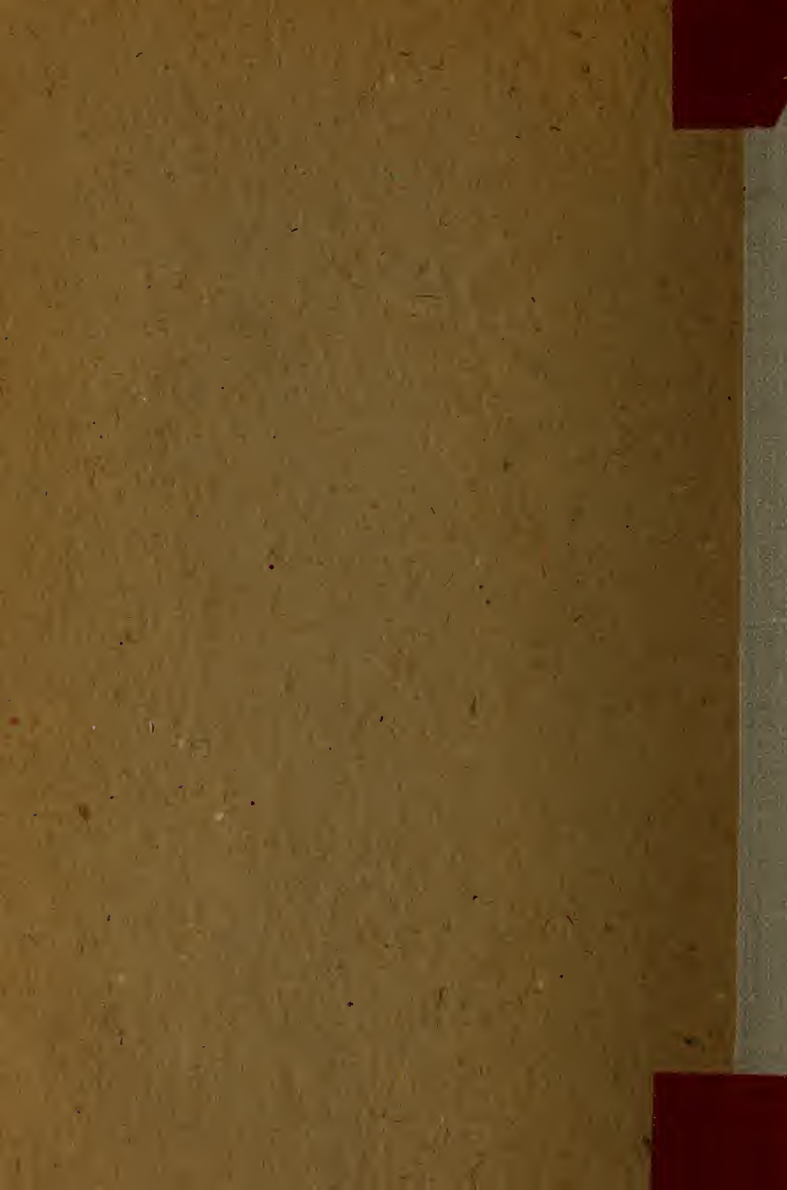




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A KEY

TO HOLMAN AND IRVINE'S

QUESTIONS ON LOGIC.

All references in Answers 1-410, unless otherwise specified, are to Welton's Manual of Logic, Vol. I.

1. Pp. 1-5.
2. Pp. 3-9.
3. Holman and Irvine's *Questions*, Exercise 1, pp. 17-8.
4. Pp. 2-3.
5. Pp. 3-5.

It is easy to see why speech has become the one great and universal medium of communication amongst men. In addition to the fact that the expression of thought and feeling by means of vocal utterance is natural to all men—even deaf-mutes are said to make some vocal sounds and to attach a definite meaning to them—and that men generally retain the power of speech even when old age or sickness has deprived them of most of the other possible means of communicating with their fellows, as by gestures, it is a power which can always be promptly brought into use, is available as well in the dark as in the light, and is of service at some considerable distance. But, above all, there is the superiority of a system of conventional signs over one merely imitative; a superiority so marked that the use of some such system was bound to attend and accompany developing powers of thought.

Neither by painting, sculpture, hieroglyphics, nor imitative gestures can full and distinct expression be given to all the ideas and relations which can be apprehended by thought. An artist

or a sculptor can express and suggest much by his brush or by his chisel; but, after all, he has to depend for the interpretation of his meaning upon the mind of the beholder, as must the man who makes an imitative gesture. The contradictory interpretations which have been given of many famous works of art, especially pictures, show—as does, indeed, the very need for verbal commentaries on them—that the artist's meaning may be altogether missed, or imperfectly grasped, by the majority even of those who give thought and time to try and understand it. And to those who have caught the idea intended to be conveyed, not nearly so many and so fine shades of meaning, inference, and consequence, can be unambiguously conveyed as by spoken language. If we add to this the time necessary to produce even a rough sketch, much more a finished picture or sculpture, as compared with that required to convey by word of mouth the idea it would embody, and further consider the difficulty of making one's meaning clear by imitative gestures, which every traveller in a foreign country of whose language he is ignorant has experienced, we shall have found sufficient reasons why speech has become the universal medium of communication amongst mankind. Of course, as written words are merely an arbitrary representation of speech, they are a comparatively late addition to man's means of communication, and are an extension of the usefulness of the old means rather than the introduction of a new.

6. Pp. 5-9.

7. *Court and Oil*.—See pp. 7-8.

Foot.—Specialized in linear measurement; generalized in the meaning 'at the bottom of.'

Post.—Specialized as to the Postal Service; generalized in the meaning 'any place or position.'

Church.—Originally *any* place of worship; specialized when used as distinct from chapel, synagogue, temple, etc.; generalized when used to denote a formally organized religious body.

Master.—Specialized: 'Master' of Arts, Science, etc., 'Master' of a College; generalized: 'having a command (intellectual, moral, or physical) over.'

Class.—Specialized: 'the classes and the masses.'

Commons.—Specialized: House of 'Commons'; and in sense of rations.

Doctor.—Both specialized and generalized in the common use of 'doctor' as signifying a medical practitioner.

Any good Etymological Dictionary will give full information for this answer.

8. Pp. 5-9, 57.

9. Pp. 10-2, 13 (§ 7).

10. Pp. 12-3.

11. Pp. 20-3.

12. Pp. 15-6, 19-20; *cf.* 13-5, 16-9.

13. P. 14. Abstraction is the selection of one aspect or element of a complex whole as the subject of investigation or thought. Such selection is always governed and determined by the end in view. This process is, therefore, a methodical activity of thought, by which we attempt to reach the unity of a universal through the analysis of the concrete particulars which are given in experience. Every concept is thus a result of abstraction, and the more general the concept the further has abstraction been carried. In this we find the relation of connotation and denotation: abstraction diminishes the intension or connotation, but increases the extension or denotation. (*See* p. 72; *cf.* pp. 60-4.)

14. Pp. 14, 16-7.

15. Pp. 16-20. Some logicians divide it into Formal and Applied. Formal logicians omit Method.

16. Pp. 14-5, 19.

17. Pp. 20-3.

18. Pp. 10-3.

19. Pp. 18, 15, 19-21. When Material is distinguished from Applied Logic, the word Material should refer to the objective view discussed in p. 18, and Applied in the sense given on p. 21. But there is really no difference between them in their ordinary use.

20. Pp. 18, 19-20 (§ 9).

21. Pp. 10-1, 12-3.

22. P. 18 (last paragraph). In a strict sense of the word *subjective*, it may be applied to the Conceptualist Logic of Kant, Hamilton, and Mansel (*see* p. 17).

23. Pp. 10-1, 13-6, 19-20; *cf.* 16-9.

24. Pp. 16-9, 20-1.

25. Pp. 11 (last paragraph)-2, 13, 19-20, 24.

26. Pp. 25-7.

27. Pp. 26-9.

28. Pp. 24-5.

29. Pp. 1-3, 28-9.

30. Pp. 27-9, 52; *cf.* 156-7.

31. Pp. 30-8. Only one statement of each Law is necessary, and no discussion of the form of those statements required.

32. Pp. 33-7.

33. Pp. 30-1. The Laws should be stated (*see* pp. 31, 33, 34, 37).

34. Pp. 31-3.

35. Pp. 30-8.

36. Pp. 37-8.

37. Pp. 38-9.

38. Pp. 31-3.

39. Pp. 30-1, 34, 35-7.

40. Pp. 30-1.

41. Pp. 40-2. Names are primarily names of things, and secondarily names of our ideas of those things; but things are only known to us through our ideas of them, and some things exist only in idea, as, *e.g.*, the centaur and other products of imagination. But, as thought is concerned with the interpretation of reality, it is emphatically in relation to reality that we use names. To make an actual separation, however, between thought and things is to make knowledge impossible; hence, we may say that names are names both of things and of ideas, that no thing can exist for us apart from an idea, and that all ideas must be based on experience of things.

42. Pp. 42-3. Note also the inapplicability of a grammatical classification to logic.

43. There is no formal logical difference—*see* pp. 42-3—as each can form a term in a formal proposition. But there is this important distinction between the substantive and adjective use of words—that the former applies to the concrete and particular, the latter to the abstract and universal. Hence, predicates are always adjectival in their force (*cf.* pp. 159, 197).

44. Pp. 42-3.

45. Pp. 44-5. (For examples *see* pp. 45-77 *passim*.) No discussion of each class is required; but the basis of each classification should be briefly expounded.

46. Pp. 44. Divisions (i), (ii), and (iii); for reasons see the discussions on these divisions.

47. Pp. 45-7.

48. Pp. 49-50, 74 (ii).

49. Pp. 45-7.

50. Pp. 52-60, 74-5.

51. Pp. 53-4.

52. Pp. 54-7.

53. Pp. 45-7, 74-5.

54. Pp. 54-7.

55. Pp. 60-4.

56. Pp. 62-3.

57. Pp. 68, 70-1.

Parallel.—Positive, because it implies the presence of a certain relation between two things.

Alien.—Negative, because it is equivalent to 'not-native.'

Idle.—Privative, because it denotes the absence of the quality of industry in one who might be industrious.

Unhappy.—Privative, as it is only applied to beings capable of happiness (*see* p. 71).

Not-white.—Negative. For a discussion of such terms and their ambiguity, *see* pp. 36, 68-9.

58. Pp. 65-71.

59. Pp. 44 (first paragraph), 72-4, 75-7; *cf.* 410-1.

60. *Organism*.—Univocal, general, connotative, positive, concrete, absolute.

Force.—Equivocal { (1) That which causes motion or exerts pressure.
(2) That which has importance or significance.
(3) An army.

(1) General, connotative, positive, abstract, absolute.

(2) Singular, non-connotative, positive, abstract, absolute.

(3) General-collective, connotative, positive, concrete, absolute.

Nationality.—Univocal, singular, non-connotative, positive, abstract, absolute.

His Eminence.—Univocal, general, connotative, positive, concrete, absolute.

Our American Cousin.—Equivocal: (1) a generic term for Americans, (2) referring to one particular individual.

(1) General, (2) Singular, connotative, positive, concrete, relative.

Monopoly.—Univocal, general, connotative, positive, concrete, absolute.

The Renaissance.—Univocal, singular, connotative, positive, concrete, absolute.

The Judicature.—Univocal, general-collective, connotative, positive, concrete, absolute.

61. Pp. 72–3.

62. This expresses the relation between Connotation and Denotation in Conceptualist terms (*see* pp. 60–4).

63. There is no series, and, therefore, no relation of Denotation and Connotation between the terms.

(1) *Law* connotes the presence of uniformity, and, as this holds, in some form or other, universally, the denotation is of the widest possible kind (*cf.* vol. ii., p. 200).

(2) *Crime* connotes an offence of a certain gravity against certain laws of the land, and its denotation will be co-extensive with these special governmental laws, and hence less than that of law.

(3) *Illegality* connotes any offence against the laws of the land, and its denotation is therefore wider than that of crime, since it applies to all governmental laws, and less than that of law (which includes mental, moral, and physical law).

(4) *Legislator* connotes a person officially engaged in formulating governmental law, and its denotation is limited to such people as take part in such work. It is entirely out of relation, as far as 'series' goes, with the other terms, and cannot, therefore, be compared with them.

64. Pp. 76–7.

As a term is the verbal sign of a notion, what is said about the latter on pp. 76–7 applies, *mutatis mutandis*, to the former.

65. Pp. 44, 16–8, 19–20; *cf.* p. 196.

66. Pp. 72–5.

67. Pp. 72, 68 (Possessive = Positive), 70–1, 44–5, 70, 65, 232–6, 88, 160–1.

68. *Equal*.—Univocal, general, connotative, positive, concrete, relative.

Equation.—Equivocal { (1) The attribute of equality.
(2) A mathematical statement.

(1) Singular, non-connotative, positive, abstract, absolute.

(2) General, connotative, positive, concrete, absolute.

Equality.—Univocal, singular, non-connotative, positive, abstract, absolute.

Equalness.—Univocal, singular, non-connotative, positive, abstract, absolute.

Inequality.—Univocal, singular, non-connotative, negative, abstract, absolute.

Equalization.—Univocal, singular, non-connotative, positive, abstract, absolute.

69. *Westminster Abbey*.—Here 'Abbey' is a general connotative name, whilst 'Westminster' is a singular non-connotative name—it simply points out *which* abbey is meant, and limits it to one. The effect of the combination of the two names is to make a singular significant name, *i.e.* it is Connotative.

The Mikado of Japan.—Exactly as above, 'Mikado' being general (*cf.* King) and Japan singular. A significant singular name, *i.e.* Connotative.

Barmouth.—A singular Proper Name, and therefore Non-Connotative. Its etymology does not make it capable of definition.

70. Substance, organism, animal, vertebrate, human, child, schoolboy.

71. These words should be first classified as Categorematic and Syncategorematic.

Syncategorematic—*in, alas, and.*

Categorematic—all the others. These may be further classified by giving their logical characteristics.

(1) *Chemist, chemical, black, paper, monkey, cheese, sincere, deaf, a-never-to-be-forgotten, foot,* are all general, connotative, positive, concrete, absolute.

(2) *Non-combatant* is negative, otherwise its characteristics are the same as the above.

(3) *Sublimity* and *darkness* are singular, non-connotative, positive, abstract, absolute.

(4) *Annoyance* and *volition* are each equivocal, denoting (1) a concrete act, when they are general and concrete, as (1); (2) an aspect of mental experience, when they are singular and abstract, as (2).

(5) *Liverpool, Buffalo Bill,* are singular, proper, non-connotative, positive, concrete, absolute.

(6) *The Wild Man of the West* is singular, connotative, positive, concrete, absolute.

72. (1) Connotative Abstract Names—colour, virtue, humanity.

(2) Connotative Singular Names—the present Prime Minister, the highest mountain in England, the first king of Prussia.

(3) General Abstract Names—immorality, fault, vice.

(4) Collective General Names—army, crowd, family.

(5) Relative Names—father, subject, wife.

(6) Equivocal Names—charm, bat, nail.

(1) Colour is Abstract since we think of the quality of colour apart from coloured things, and connotative because it implies the attribute of 'producing colour sensations.' 'Virtue' exists only in a moral agent, and implies intention and conformity to a moral code. 'Humanity' is found only in human beings, and connotes animality and rationality.

(2) These names connote (a) member of Parliament, head of Cabinet, etc.; (b) having all the attributes connoted by mountain, in England, higher than any other mountain in England; (c) having all the attributes connoted by king, reigning at a certain time, in a certain place. They are Singular, for they can be applied, in the same sense, only to a single object.

(3) The names are General, since they apply to many attributes or properties of the same kind; Abstract, since they signify concepts of purely intellectual existences.

(4) Each term in this group indicates a number of individuals regarded as one object. The terms apply to the wholes, but not to each member of them, and are therefore Collective.

(5) Father has no meaning out of relation to children, subject to ruler, and wife to husband. Hence these are Relative terms.

(6) Charm may mean beauty, an incantation, etc.; bat denotes an animal, an instrument used in games, etc.; nail signifies the horny substance on the fingers, a measure, etc. These words are therefore Equivocal.

73. *Bill*—

(1) An account.

(2) An Act of Parliament.

(3) A printed notice.

(4) A money form.

(5) An implement of war.

(6) Part of a bird.

(1)–(4) are specializations of the notion of an 'index' (cf. Latin). (5) and (6) are from a different root meaning 'hooked.'

Term—

- | | |
|--------------------------|--|
| (1) A name. | } Specialization or Generali-
zation of the 'root' idea of
limitation or boundary. |
| (2) A school period. | |
| (3) A condition. | |
| (4) An algebraic factor. | |

There are also special meanings in Architecture, Algebra, Euclid, etc.

Peer—

- | | |
|----------------------|----------------------------------|
| (1) An equal. | } (2) is a specialization of (1) |
| (2) A titled person. | |
| (3) To peep. | |

Oxygen—Univocal.

Sense—

- | | |
|--|--|
| (1) Reason. | } Ambiguity arising from
the vagueness of popular
usage. |
| (2) Power of responding to stimulation of a sense-organ. | |
| (3) Meaning. | |

Ball—

- | | |
|----------------------------|--|
| (1) Dancing entertainment. | } (2), (3), and (4) are cases of
specialization of the original
notion of 'round.' |
| (2) A sphere. | |
| (3) A plaything. | |
| (4) A bullet. | |

Order—

- | | |
|-----------------------|--|
| (1) A regular series. | } (2), (3), and (4) are special-
izations of (1). |
| (2) A command. | |
| (3) A class (botany). | |
| (4) A title. | |
| (5) To command, etc. | |

Minister—

- | | |
|----------------------------------|--|
| (1) A servant. | } Specializations of the idea
of 'serving.' |
| (2) A clergyman. | |
| (3) A legislator holding office. | |
| (4) A foreign representative. | |
| (5) To wait upon, etc. | |

Teapot—Univocal.

Interest—

- | | |
|------------------------------------|--|
| (1) Affective aspect of attention. | } All modifications and specializations of general idea of being of importance. (5) is a combination of (3) and (4). |
| (2) Participation in value. | |
| (3) Advantage. | |
| (4) Premium on loan. | |
| (5) Unexpected advantage. | |

Paper—

- | | |
|--|---|
| (1) Substance made from pulp in thin leaves suitable for writing on. | } (2)–(6) are specializations of (1). Their connexion with each other is evident in (2)–(5) in the sequence here given. |
| (2) A piece of such substance. | |
| (3) A document. | |
| (4) A newspaper. | |
| (5) Evidence of indebtedness. | |
| (6) Hangings for walls of rooms. | |

Stamen—

- | | |
|--|---|
| (1) A thread. | } (2) and (3) are specializations of (1). (4) is a generalization of (3). |
| (2) Male organ of flowers (in plural <i>stamina</i>). | |
| (3) The fixed firm part of a body. | |
| (4) The chief support of anything. | |

Class—

- | | |
|---|--|
| (1) A group of similar individuals. | } (2) is a specialization, and (3) a generalization, of (1). |
| (2) A number of students of similar standing. | |
| (3) A division of objects in idea. | |

Other meanings can be obtained from a good Etymological Dictionary, and the processes of specialization and generalization can be traced. Note the differences of meaning caused by context, especially when the function of the word (*i.e.*, its “part of speech”) is changed.

74. Pp. 52–3, 57–8. In answer to the second part of the question:—Definition (*cf.* pp. 107–8), and Division [*cf.* pp. 123, 125 top of page.]

75. P. 44. Examples should be given, and their appropriateness demonstrated.

76. Pp. 54-60.

77. Pp. 80-6.

78. Pp. 78-80, 88.

79. All the attributes of the genus must be attributes of the species ; and since species is genus *plus* differentia, therefore genus is a part of the species, in connotation.

Since the sum of the species equals the genus, therefore each species is a part of the genus, in denotation.

Also see pp. 81, 83 (beginning of § 36).

80. Pp. 80, 83-6.

81. Pp. 81-2, 86-7.

82. In comprehension (*i.e.*, connotation), Species includes Genus and Differentia. *Propria* follow from the connotation, or are necessarily connected with it. *Accidentia* have no *known* connexion with connotation. We can, therefore, strictly speaking, only interpret Genus, Species, and Differentia in connotation.

In denotation, Genus embraces Species. *Proprium* refers only to connotation, for whatever has the connotation of the Species must have its *Propria*, and this does not, therefore, affect the denotation of the Species. Under Species come (in denotation) individuals, who are distinguished from each other by *Accidentia*.

For examples see pp. 81-6 *passim*.

83. Pp. 88, 160-1.

The first sentence is Synthetic, since 'of burden' is not a part of the connotation of 'horse,' but merely a separable *accidens* of the class 'horse.'

The second sentence is Analytic, for 'oak' is a species under the genus 'tree,' and, therefore, everything implied by 'tree' is part of the connotation of 'oak.'

84. Genus and species:—man — painter ; building — castle : servant—cook.

Species and *accidens* :—swan—web-footed ; horse—roan ; book —octavo.

Species and *proprium* :—triangle—three-angled, equal to two right angles ; soldier—disciplined ; man—able to cook food.

Differentia between genus and species :— $\left. \begin{array}{l} \text{figure} \\ \text{triangle} \end{array} \right\}$ —three-sided ;
 building $\left. \vphantom{\begin{array}{l} \text{figure} \\ \text{triangle} \end{array}} \right\}$ —for habitation ; servant $\left. \vphantom{\begin{array}{l} \text{figure} \\ \text{triangle} \end{array}} \right\}$ —preparing of food.
 house $\left. \vphantom{\begin{array}{l} \text{figure} \\ \text{triangle} \end{array}} \right\}$ —for habitation ; cook $\left. \vphantom{\begin{array}{l} \text{figure} \\ \text{triangle} \end{array}} \right\}$ —preparing of food.

85. (1) A Proprium—it follows as a necessary deduction from meaning of square.

(2) A Separable Accidens—no necessary connexion.

(3) An Inseparable Accidens—always present, but no causal connexion known.

(4) A Separable Accidens—no necessary connexion.

(5) A Differentia—between the genus 'figure' and the species 'triangle.'

(6) A Genus—of which 'republics' are a species.

86.

	<i>Genus.</i>	<i>Differentia.</i>	<i>Proprium.</i>	<i>Accidens.</i>
Gold Metal.	Atomic weight 196·2.	Sinks in water.	Used for money.
Darwinism ...	Scientific hypothesis.	Dealing with history of organisms.	Accounting for extinction of certain organisms.	Provoking clerical opposition.
Rhombus ...	Figure.	Equilateral, four-sided, non-rectangular.	Opposite angles equal.	One angle 80°.
House ...	Building.	For habitation.	Shelter.	Stone.

The giving of reasons is simply showing that the above fulfil the definitions of the Predicables.

87. Pp. 80, 82-4.

88. (1) Alkalies united with acids are salt-forming.

'Salt-forming' is a Proprium.

(2) The tiger is predatory.

'Predatory' is an Inseparable Accidens.

(3) Some governments are dependent on force.

'Dependent on force' is a Separable Accidens.

(4) James' rule was oppressive.

'Oppressive' is a Separable Accidens.

89. Pp. 89-90, 101-3, 90-1.

90. Pp. 101-3. Mill's scheme is so vague that many arrangements might be made. The following is suggested:—

I. Feelings—Reputation.

II. Minds.

III. Bodies—Force, the Church of England, logic

IV. Successions—the Nineteenth Century.

91. Pp. 94 (ii), 103-6, 90-3; cf. 89-90.

92. Pp. 90-3, 94 (iv)-5, 97-8.

93. P. 100. These should be critically compared with the more commonly known schemes.

94. Pp. 90-103, 89.

95. Pp. 92-9, 90 under *Substantia* (a), (b), 91 (bottom)-2 (top).

96. Pp. 96 (iv)-7, 89-90.

97. Pp. 78, 88, 89-90, 93-9.

98. Pp. 107-8, 111 (bottom)-2.

99. Pp. 108-10.

100. Pp. 107, 54-7, 114-6; cf. 112-4.

Parallel straight lines are straight lines (genus) which are always and everywhere equidistant from each other (differentia).

Ruminant animal is an animal (genus) which chews the cud (differentia).

Oxygen is an element (genus) whose atomic weight is 15.96 (differentia).

101. Pp. 108-14. The old logicians assumed genus and species to be fixed and determinate. Modern thought recognizes that all definitions are liable to modification with progress of knowledge.

102. Pp. 107-8, 111 (bottom)-3. In the Moral Sciences the definitions of Free Will, Utilitarianism, Mind, Wealth, Capital, Wages, and Interest are good examples, and in the Natural Sciences the controversies as to the meaning of such terms as cause, force, matter, motion.

103. Pp. 107, 110-11.

104. Pp. 114-8, 119 (last par.)-20.

105. Pp. 107-8, 110-4; cf. 120.

106. Every true logical definition is complete. The term 'Incomplete Definition' (though it was used by Mill) is therefore a misnomer, and, at the best, a very slovenly and unscientific expression. As to what Mill meant by the term, see pp. 121 (iv)-2.

107. Pp. 107-8, 110-14 (top).

108. Pp. 118-21. Inseparable Accidentia, and Propria, supply us with characteristics which would distinguish a given object from all others, e.g., 'man is an animal that cooks his food (accidens),' 'an honest man never tells a lie (proprium)'; but these are just the kind of attributes a Definition ignores,

because they are not essential attributes of the concepts (*cf.* p. 122).

109. Pp. 107 (par. 1), 122 (par. 3), 108-10, 118-20. The Scholastics held that all definitions are *per genus et differentiam*, and then divided into Nominal and Real definitions.

110. Pp. 118-22.

111. *Gold*, being a general name, can be defined: it is a mineral (genus) whose atomic weight is 196.2 (differentia).

Coal is a general name, and is thus defined: a carbonaceous mineral (genus) consisting of impure amorphous carbon (differentia).

Legal-nuisance, also a general name: a violation of rights (genus), either of public right producing special damage, or of a private right of ownership producing a substantial diminution in the enjoyment thereof (differentia).

Civilization, being a general abstract name, is defined: a condition of society (genus) in which the arts and sciences are more or less highly developed (differentia).

Cleopatra's Needle is a Proper Name, and therefore indefinable—it can only be described.

112. Pp. 117 (par. 3), 110-13.

113. Pp. 107-8, 111-3.

114. *Cf.* pp. 114-8.

115. Pp. 110-4.

116. Pp. 107-8, 119-20; *cf.* 110-13.

117. (1) *Square*, *exogens*, *thermometer*, being scientific terms, have their connotation very precise and definite, and come first in order of definability.

(2) *This ear*, *the present Chancellor of the University of London*, being singular significant terms, are definable, though the limiting words 'this,' 'the present,' add an element of mere description.

(3) *Book*, *house*, *cart*, *being*, have very wide denotation, and, being words of popular use, have a vague connotation.

(4) *Victoria*, *Cambridge*, *dulness*, *brilliancy*, being Proper or Singular-Abstract terms, have no connotation, and cannot be defined.

118. (1) *Rectangle* is a scientific term with a precise connotation, and is, consequently, perfectly definable.

(2) *Copper*, *brass*, *marriage*, *tree*, *motive*, *theft*, have a scientific,

but also a popular usage, and their connotation is consequently hardly so precise as is that of the terms in (1), as the popular usage tends to fringe the scientific one.

(3) *Table* is a term whose denotation predominates over its connotation, and hence it is more difficult to define.

(4) *Feeling* and *substance*, being terms signifying ultimate objects of consciousness, cannot be further defined—only described in other words, though *substance* has also a popular usage in which it denotes anything material. Here the multiplicity and variety of the denotation make it very difficult to determine the connotation.

119. Pp. 107, 54-6, 108, 111-14.

120. (1) Figurative. Breaks Rules I. and II.

(2) Valid—a negative term negatively defined (*cf.* p. 118).

(3) This is not a definition, but merely a kind of description stating an accidens. Breaks Rule I.

(4) Ambiguous and negative. Breaks Rules I. and IV.

(5) Synonyms. Breaks Rules I. and III.

121. Pp. 123, 125-7.

122. Pp. 127-9.

123. Pp. 130-3.

124. (a) Not exhaustive; there are gold, aluminium, etc., pens. Breaks Rule II.

(b) Physical partition.

(c) Correct logical division: really dichotomous.

(d) Correct logical division.

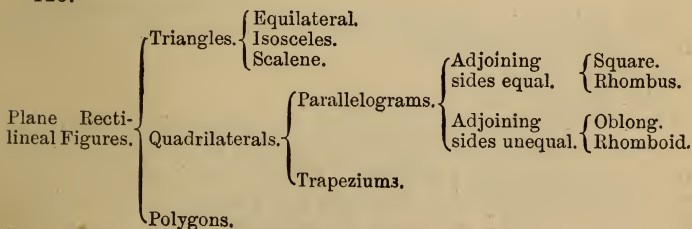
(e) Enumeration, not logical division.

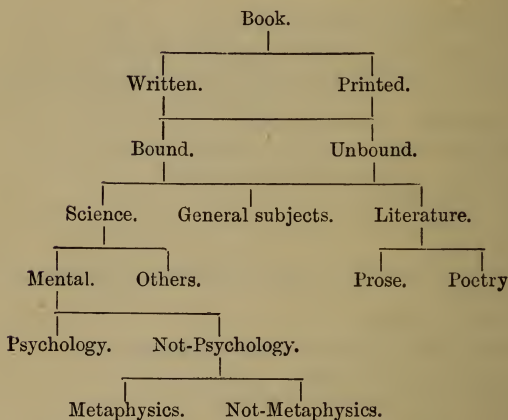
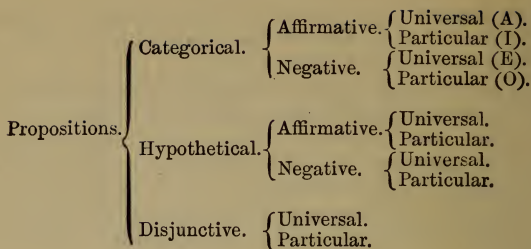
(f) Different bases; not exhaustive. Breaks Rules I. and II.

(g) Verbal distinction of the meanings of an ambiguous term.

(h) Different bases; not exhaustive. Breaks Rules I. and II.

125.





Notice that in this last division there is (1) Co-division.

(2) Sub-division.

(3) Dichotomous division.

The division is, obviously, incomplete, and may be carried further on the same lines.

126. Pp. 125-6.

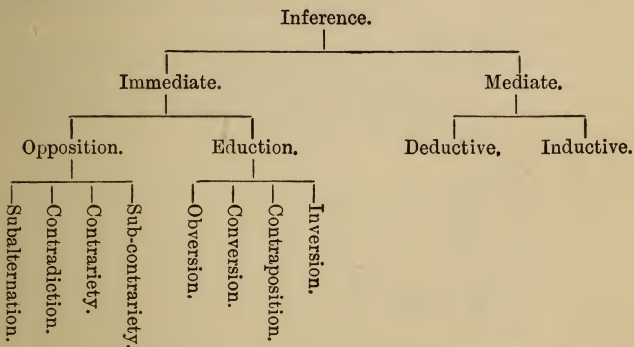
127. Pp. 123, 125, 127; *cf.* 128-9.

128. Yes. Definition, by giving the connotation, tells us (*a*) to what proximate genus the thing signified belongs, and (*b*) what are its distinguishing attributes. Division continues the process of supplying information, and tells us (*c*) what co-ordinate classes the object is allied with and (*d*) what sub-classes it embraces.

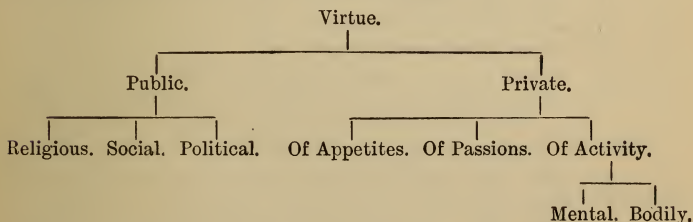
We only fully understand a term when we know not only its meaning or implication for thought, but also its application to reality. As Kant says: "Concepts without percepts are empty." *Also see p. 125.*

129. Pp. 123, 128 (Rule I.).

130. Inference is a process of reasoning (genus) by which we pass from affirming one or more propositions to another different judgment which we make as the necessary result of accepting the first (differentia).



Virtue is rational effort (genus) in conformity with the highest ideal conceived by the agent (differentia).



For the latter part of the question *see pp. 114, 127.*

131. (1) Physical partition (*cf.* p. 126).

(2) Different bases, giving cross-division. Breaks Rule I.

(3) Correct division by dichotomy.

(4) Metaphysical analysis (*cf.* p. 126).

(5) Metaphysical analysis and possibly partly physical partition.
 (6) Verbal distinction of the meanings of an ambiguous term.

(7) Different bases. Breaks Rule I.

132. Accidental difference is an awkward way of expressing *Accidens* (see pp. 85-6). Of course, the possession of an *accidens* makes an individual or class *different* from others. As the word is used thus widely in the one part of the question it is probably used as widely in the other, and therefore by 'specific difference' is probably meant not only Specific Differentia (see p. 84), but also Specific Propria (p. 85).

The rules of Definition are useful in ensuring good and scientific definitions, the use of which is discussed on pp. 107-8. The rules of Division are similarly useful in enabling us to classify correctly and usefully (cf. pp. 134-44).

133. Pp. 133-4.

134. Pp. 134-44.

135. Pp. 137, 141-4.

136. Pp. 144-6.

137. Pp. 146-53.

138. Pp. 136-7.

139. Pp. 125-6, 134-6.

140. Pp. 146-53.

141. Pp. 137-9.

142. Pp. 112-3, 139-41.

143. Pp. 139-44, 145-6.

144. (a) All birds *are* two-winged. **A.**

(b) All matter *is* sense-evidenced. **A.**

(c) That a thief has any sense of honour *is* false. **A.**

(d) Some of our ideas *are not* deserving of consideration. **O.**

(e) { 1. Some (few) men *are* consistent in conduct. **I.**
 2. Some (most) men *are not* consistent in conduct. **O.**

(f) and (g). The assertions about politician, Republican, and Royalist are the respective subjects, and predicate is 'matter of public notoriety' (**A**). But disregarding the 'every one knows' which is the predication in each case, it is well to notice that the remaining clauses are sentences of differing logical aspect. The logical subject, in the Passive Voice, invariably comes after the verb. Thus in (f) we should have 'No combination of Republican and Royalist *is* capable of being a politician' (**E**); and in (g)

'No politician *is* able to combine the opinions of a Royalist and a Republican' (E).

(h) No doers of injury *are* forgiving. E.

(i) Some who say they are honest *are not* honest. O.

(j) { 1. Some (most) of his shots *are* successful. I.

{ 2. Some (two) of his shots *are not* successful. O.

145. (a) { 1. Cambridge *is* an ancient university town. A.

{ 2. Oxford " " " " A.

{ 3. No other town in England *is* an ancient university town. E.

(b) No ignorant and lazy man *is* not-poor. E.

This is better expressed by the equivalent (obverse, see *Manual*, pp. 251-4):—All ignorant and lazy men *are* poor. A.

(c) { 1. All greatness *is not* good = Some greatness *is not* good. O.

{ 2. All goodness *is* great. A.

(d) { 1. All the learned *are* studious and ambitious. A.

{ 2. Some who are studious and ambitious *are not* learned. O.

(e) { 1. Some old things *are not* the best. O.

{ 2. All old things *are* deserving of careful consideration. A.

(f) An increase of numbers *is* mirth-increasing. A.

(g) This sentence asserts that it is false to say:—

{ 1. All brave men are Englishmen.

{ 2. All not-brave men are Englishmen.

To deny these is to assert that:—

{ 1. Some brave men *are not* English. O.

{ 2. Some not-brave men *are not* English. O.

146. (a) Success *is* most conducive to success.

(b) Many such *are* in the country.

(c) He who has no wealth *is* envious of that of others.

(d) To kick a man when he is down *is* cowardly.

(e) All competent judges of scientific matters *are* experts.

(f) The glories which surround a throne *are* great.

147. (a) No joy the world can give *is* equal to that it takes away. Universal Negative (E).

(b) He who never felt a wound *is* a jester at scars. Universal Affirmative (A).

(c) Axioms *are* self-evident. Universal Affirmative (A).

(d) All who can stand the climate of Africa *are* natives (A).

(e) No Greek present at Thermopylae *is* saved (E).

- (f) Some things that glitter *are not* gold (O).
148. (a) Some of his answers *are not* wrong.
- (b) No endeavour of yours *is* able to accomplish it.
- (c) No wit *is* as good as bought wit.
- (d) { 1. Girton and Newnham *are* colleges for ladies, at Cambridge.
2. No other colleges for ladies *are* at Cambridge.
- (e) King's College Chapel, Cambridge, *is* worth the attention of visitors.
- (f) A failure after boasting *is* most disgusting.
- (g) Some that act honourably *are not* to be forgotten.
- (h) Some Greeks *are not* dishonest.
- (i) Some things with fine feathers *are not* fine birds.
- (j) Some Englishmen *are* great generals.
- (k) Some (few) graduates *are* scholars.
- (l) All flowering plants *are* beautiful.
149. These sentences are open to the following readings:—
- (a) 1. *Some only* of the men *are* disgraceful in their behaviour.
2. *Some at least, it may be all,* of the men *are* disgraceful in their behaviour.
- (b) 1. Some who read much *are* wise, but some who read much *are not* wise.
2. Some, it may be all, who read much *are not* wise.
- (c) 1. All the books together (collectively) cost a sovereign.
2. Each of the books (distributively) cost a sovereign.
150. (1) Feathers are light. 'All feathers *are* light' (A); since from the nature of feathers they must, at least in comparison with most other things, be light. To be 'light' is a Proprium of 'feathers,' and therefore the assertion must apply to *all* feathers.
- (2) Boys are troublesome. 'Some (most) boys *are* troublesome' (I); for though it is certain that nearly all healthy boys have an almost unlimited capacity for mischief, yet there are some natures which, even in boyhood, are marked by calmness and restraint. 'Troublesome' is therefore a Separable Accidens, and only applies to some.
- (3) Italians are musical. 'Some (most) Italians *are* musical' (I). It is morally certain that a few individual Italians, at least, are not musical, *i.e.* 'musical' is a Separable Accidens of 'Italians.'
- (4) Squares are rectangular. 'All squares *are* rectangular'

(A), or they would not be squares. 'Rectangular,' being a Differentia, must apply to *all* squares.

(5) Liars are not moral. 'No liars *are* moral' (E), *i.e.* in so far as they are liars, since lying is immoral. 'Not-moral' is a Proprium of 'liars.'

(6) Lies are not successful. 'Some lies *are not* successful' (O), for it is well known that some lies are, at least temporarily, successful. 'Not-successful' is a Separable Accidens of 'lies.'

151. (a) All capital *is* wealth.

Some labour *is not* fairly remunerated.

(b) Honesty *is* a virtue.

Carelessness *is* a fault.

(c) An alphabet *is* essential to written language.

The army *is* necessary for national defence.

(d) Carlyle *is* the writer spoken of.

Lord Salisbury *is* the present Prime Minister.

(e) Its blueness *is* most striking.

Honesty *is not* impolitic.

(f) All non-combatants *are* non-patriotic.

All non-Christians *are* non-episcopalian.

(g) All fathers *are* sons.

All grandmothers *are* mothers.

152. (a) No horse-dealers *are* honest.

(b) Some (most) Englishmen *are not* brave.

'As a race' means 'most are.' Since *most are* and *most are not* are together greater than *all*, they cannot both be true. Hence *most are* is contradicted by *most are not*.

(c) All the Volunteers *are* deserving of discredit.

(d) The original is equivalent to 'All the unconvinced *are* prejudiced.' If this is false, then the truth is: Some unconvinced *are not* prejudiced.

(e) Some men *are not* liars.

(f) 'Honesty is not necessarily the best policy.'

Read in denotation the original proposition equals 'Every act of honesty *is* the best policy.' If this is false, then: Some acts of honesty *are not* the best policy.

153. (1) All the material of thought *is* (directly or indirectly) objective (A).

(2) All these objects *are* conditions of sense impressions (A).

(3) All these sense impressions *are* stimuli to the mind (A).

(4) All these impressions *are* idea-originating (A).

154. (1) Is a Hypothetical, and cannot be adequately expressed in categorical form. The given statement is the simplest possible.

(2) All rainfalls are pourings. But more elegantly expressed as a Hypothetical: If it rains, it pours.

(3) Categorical. May be put: Some (most) of the called *are not* chosen.

(4) Is a Hypothetical, and equivalent to: If help does not arrive, we are beaten.

(5) None who eat their cake *are* able still to possess it. Or hypothetically: If you eat your cake, you cease to possess it.

(6) All who are used after their deserts *are* whipped.

155. (1) Some smiling men *are* villains.

(2) Some (most) men with opinions *are not* thoughtful.

(3) All wise men *are* cloaked in cloudy weather.

(4) All who oblige her *are* always hateful to her. Or better hypothetically: If a person obliges her, that person is thenceforth hateful to her.

(5) Some of the unfallen, though less bright angels *are* still bright.

156. Pp. 154-5. The examples should be actual sentences, not symbolic expressions. Numerous examples will be found on pp. 163-71, 181-4, 187-90.

157. Pp. 156-7.

158. Pp. 157-8.

159. Pp. 158-60. The interpretative part of the first sentence is the word 'sword,' which is, consequently, the predicate (*see* p. 159 *ad fin*). Hence the logical form is: Thy future warrant *is* thy sword. In the second sentence the subject is obviously pointed out by the demonstrative 'that.' Read: That (thing) *is* exactly what I wanted.

160. Pp. 161-3, 171.

161. Pp. 163-71.

162. Pp. 173 (§ 73, 1st par.), 171-3; *cf.* 163-71.

163. Pp. 173-6.

164. Pp. 176-7.

165. Pp. 178-80.

166. The correct answer is 'Not at all'; for the quantity of a proposition depends on its subject, and is independent of its quality. But the examiner probably meant to refer to the

quantity of the predicate, and not of the proposition. Taking this view, it is a question on the Distribution of Terms (*see* pp. 172-3). By 'Quantity' is meant quantity of the Predicate, which is always determined by the Quality of the proposition. Under the Fourfold scheme of Propositions the relation is a necessary one, but under Hamilton's scheme of Quantification of the Predicate (*see* pp. 200-7) it is not.

167. Pp. 192-5.

168. Pp. 192-5.

169. Pp. 193-4.

170. Pp. 185-6.

171. Pp. 186-7.

172. (1) If a man is a thief, he deserves punishment.

(2) If the facts are as stated in this report, they are not as you stated them.

(3) If that offence is committed by you, it will lead me to inflict punishment upon you.

(4) If a person studies well, he will gain.

(5) If a combination of two parts of hydrogen and one part of oxygen is effected, that combination is water.

(6) If this work requires three hours a day, it is more than I can do.

173. Pp. 185-6.

174. (1) Is a pure hypothetical.

(2) Is a modal particular. *See* p. 186 (§ 78 [ii]).

(3) Is the denotative symbolic form of the hypothetical (the concrete conditional—*see* p. 184, *top*).

(4) Is a particular application of the pure universal hypothetical: If any candidate gain 50 per cent. of the marks, that candidate will pass.

(5) Is a disjunctive stated in the denotative form, and in which the alternative predicates are species under the subject genus. As 'alien' simply means non-British, the proposition is a direct application of the Principle of Excluded Middle.

(6) Is a singular disjunctive.

175. Pp. 187-90.

176. Pp. 192, 190-1.

177. Pp. 161-2, 186, 178 (i) (a) (b), 192.

178. Pp. 190-2.

179. Pp. 88, 160-1.

180. Pp. 162-3.

181. A truth is a statement agreeing with objective reality. A judgment may be true or false, though it always appears true to the mind which makes it. It is a mental affirmation of some interpretation of reality. A Proposition is an actual or possible judgment expressed in language. A sentence may be the expression of a wish, or a command, etc.: every proposition is a sentence, but not every sentence, therefore, is a proposition. Formal Logic is concerned primarily with judgments, but deals with them under the form of propositions. See pp. 14, 154-5, 11 (pars. 2 and 3).

182. Pp. 192-5.

183. Pp. 196, 14, 17-8. Our whole view of Logic must depend upon the view taken of predication; and the validity of several inferences depends upon the implications of existence contained in the various forms of proposition (*cf.* pp. 258-9, 340-1, 359-60).

184. Pp. 197-8; *cf.* pp. 14, 159.

185. Pp. 198-200.

186. The equational reading is an attempt to give greater exactness to the class-inclusion view of predication. It is the only one which strictly reads both terms in denotation. Let us now examine what is usually meant when it is said that a proposition expresses an identity. If mere numerical equality is meant, then 'All owls = some birds' means only that 'all owls' and 'some birds' are identical in number. This is doubtless true, but it can scarcely be thought sufficient. Nor can this numerical explanation be given of all propositions. What numerical equality do we get, for instance, in such a proposition as 'Justice is worthy of praise'? More than this is meant by identity. It cannot be likeness; we do not mean All owls are *like* some birds; nor can it be any partial identity. It must be absolute and total sameness. But if so, and if Owls = some birds, then Some birds = owls, a proposition which is not evidently true; for not *any* 'some,' but a *particular* 'some' is referred to, and this is not indicated by 'Some birds,' which could equally well be the subject of the proposition 'Some birds are not owls.' We must, in fact, *specify* our original predicate, and say 'Owls = owl-birds.' This is the result at which Jevons arrives (*Principles of Science*, p. 41). But will this expression hold? Either 'birds' has a meaning or it has not. If it has, then the adding it to one

side of the equation, and not to the other, destroys that equation; if it has no meaning, then the equation suggests a difference which does not exist, and we have, moreover, no predication at all, for we have asserted nothing. If *Owls* = owl-birds, then the 'owls' in the subject are owl-birds, and so the equation should stand 'Owl-birds = owl-birds.' We have here got a consistent statement, but at the cost of having lost all predication; for we have reduced the proposition to a statement of mere identity without difference, and such a statement is absolutely empty and meaningless (*see* p. 32). We have, then, reached the result that to regard both terms exclusively from the aspect of denotation leads to a mere statement of absolute identity, and thus really destroys the proposition, which no longer has any assertion to make. It is true that every proposition does assert an identity (*see* pp. 14, 159), but it does not assert *mere* identity; for all identity exists amidst difference. Every proposition, therefore, involves the assertion both of identity and of difference; in fact, each of these implies the other.

But there is another and more useful way in which a proposition may be regarded as an equation. This does not pretend to be the natural way of interpreting propositions, but only a convenient method of expressing their significance for the purposes of Symbolic Logic. Given any two terms *S* and *P*, the total number of possible combinations we can form from them is four—*SP*, *S \bar{P}* , *$\bar{S}P$* , *$\bar{S}\bar{P}$* (*\bar{S}* and *\bar{P}* = *non-S* and *non-P* respectively). Each proposition is then regarded as denying, or asserting, the existence of the things denoted by one or more of these complex terms. This reduces us, practically, to two classes of propositions; for all universal propositions are negative, in that they deny the existence of one such class, and all particular propositions are affirmative, in that they assert such existence. Thus *All S is P* denies the existence of the class *S \bar{P}* ; *No S is P* denies that of *SP*; *Some S is P* asserts that *There is SP*, and *Some S is not P* similarly affirms that *There is S \bar{P}* . Or, expressed symbolically as equations, and using 0 to express non-existence and *v* to denote 'some exist,' we have

$$\begin{array}{llll} \mathbf{A} & . & . & S a P & . & . & S\bar{P} = 0 \\ \mathbf{E} & . & . & S e P & . & . & SP = 0 \\ \mathbf{I} & . & . & S i P & . & . & SP = v \\ \mathbf{O} & . & . & S o P & . & . & S\bar{P} = v \end{array}$$

This scheme is the basis of the majority of systems of Symbolic Logic, and it enables us to deal easily with very complex terms, but it does not pretend to be anything but extremely artificial, or to be adapted for ordinary logical purposes (*cf.* pp. 220-2).

187. Pp. 17-18, 196-214.

188. Pp. 200-5.

189. Pp. 200, 205-7. Thomson admitted **U** and **Y** propositions. Dr. Keynes says, "**U** and **Y** ought certainly to receive some recognition in logic," but thinks the traditional treatment of the syllogism should be adhered to with the traditional fourfold scheme of propositions, and allows that "the addition of **U** and **Y** does not tend towards simplification, but the reverse; and their full force can be expressed in other ways" (*Formal Logic*, p. 177). This is evident when we work out the number of valid moods the admission of these two forms renders possible. Thomson gives a total of sixty-two, and he only acknowledges the first three figures of syllogism.

190. Pp. 200-2.

191. Pp. 200-7.

192. Pp. 202-5.

193. Pp. 203, 204, 207.

194. Pp. 14, 158-60, 196-8, 208-9, 198-200.

195. Pp. 17-8, 196-8, 200, 208, 209, 197-8, 205-7.

196. Pp. 209-11.

197. *See* Answer to Ques. 186; *cf.* pp. 220-2.

198. *See* Answer to Ques. 186.

199. Pp. 17-18; *cf.* pp. 16, 19-20. "Nominalism is understood to involve the assertion that generality belongs to language alone and that there is nothing general in thought. But a so-called nominalist treatment of logic does not involve this. It involves no more than a clear recognition of the importance of language as the instrument of thought" (Keynes, *Formal Logic*, p. 4). In this quotation we have the distinction drawn between extreme and moderate nominalists. But a nominalist treatment of logic is always apt to put emphasis on differences in forms of language rather than in kinds of judgment, and consequently to become too largely formal.

200. Pp. 160-1; *cf.* p. 88.

201. Pp. 17, 14, 208-11.

202. This is a dictum of Mill's (see *Exam. of Hamilton*, 3rd

Ed., p. 419). Mill's point—and it is a true one—is that as objects are classed and named according to the qualities they possess, so denotation is determined by connotation (*cf.* pp. 58, 209–11).

203. (a) pp. 159, 197–8; (b) p. 17; *cf.* p. 32, and Answer to Ques. 199.

204. Pp. 167–9, 202–3. If 'some' may mean 'perhaps none,' then every particular proposition is really hypothetical. *Some S is P* means merely *If any S exists, it may be P*. All inferences must then be interpreted in accordance with this. This consideration will apply to both the second and the third meanings referred to in the question.

205. Pp. 17–8; *cf.* 19–20, 14, 159–60, 200–9.

206. Pp. 208–9. Those propositions whose subjects are Proper Names or Singular Abstract Terms cannot be exhibited in Comprehensive form, as their subjects have no comprehension (*cf.* pp. 52–4, 75).

207. Pp. 211–14.

208. This view is regarded by Dr. Venn as convenient for the purposes of Symbolic Logic. Mr. Keynes thinks "this doctrine might be extended to ordinary Formal Logic" (*Formal Logic*, p. 187). With this, however, Dr. Venn does not agree. He points out that "things denoted by single terms generally have an existence past all dispute or doubt," and that, in the case of propositions with complex subjects, "as a rule . . . popular usage abandons the strict categorical form whenever the existence of the objects denoted is seriously doubted" (*Empirical Logic*, pp. 258–9).

One of the reasons given for holding this view is that particulars generally rest upon observation, but universals may be the result of general reasoning, of tradition, or of mere presumption. Of course, a given judgment may be false, but its justification must be found in an analysis of reality, and to this reality the judgment refers.

But it is urged that examples can be given of universal propositions which do not imply the existence of their subjects. Upon examination, however, it will be found either that the proper sphere to which the *S* belongs has not been considered, or else that the proposition does not express its meaning in a direct form—either it is hypothetical, or, if categorical, the

grammatical subject is not the logical subject. "In every [categorical] proposition, an analysis of the meaning will find a reality of which something else is affirmed or denied" (Bradley, *Principles of Logic*, p. 41). For instance, 'A square circle does not exist' means 'The nature of space is not compatible with the co-existence of square and round'; 'There are no ghosts' is really an assertion that 'The world is not a place where ghosts exist.'

On this view, moreover, the assertion of $S a P$ will not justify the assertion of $S i P$. This is a paradoxical result, for it means that a statement of partial knowledge carries more real information than a statement of full knowledge; since if we only possess limited information, and so can only assert $S i P$, we thereby affirm the existence of S ; but if we have sufficient knowledge to speak of *all* S (S remaining the same), the statement of that full knowledge immediately casts a doubt upon that existence.

Again, as every term has denotation, it is always permissible to attend to the denotation of the predicate. If we do this in the proposition $S a P$, we find that P is undistributed; that is, expressed in denotation, it is *some* P . But *some*, when used with the subject-term, carries with it an implication of existence. We must, therefore, either give *some* when it occurs in the predicate a force different from, and less than, that which it has when it belongs to the subject, or we must grant that *some* P involves the existence of P . For the former course there seems to be no justification. But, if we adopt the latter, then the existence of P carries with it that of S ; for, if *All* S is *some* P and that particular *some* P exists, then *all* S exists.

209. (1) Some writers maintain that a proposition implies the existence, not only of both its terms, but of their contradictories. Thus, a judgment containing S and P is held to involve the existence of the four terms— S , P , *non-S*, *non-P*. It is not plain, however, how a proposition can imply the existence of any term which does not appear in it. Besides, on this view it is inadmissible to make an assertion if either of the terms employed embraces the whole of the Universe of Discourse when that, as it may, coincides with the sphere of existence, and this restriction is, certainly, arbitrary. This view is, however, practically adopted both by De Morgan and by Jevons.

(2) On the other hand, some logicians, influenced, doubtless, by Nominalist doctrines, deny that existence is implied in all propositions. Spalding goes the extreme length of denying that any proposition whatever involves the existence of its terms.

(3) Mill grants the implication of existence to accidental (*i.e.* synthetic) but not to essential (or analytic) propositions (*cf.* pp. 160-1). He says: "The actual existence of the subject of the proposition is . . . only apparently, not really, implied in the predication, if an essential one. . . . But an accidental, or non-essential, affirmation does imply the real existence of the subject, because in the case of a non-existent subject there is nothing for the proposition to assert" (*Logic*, Bk. I., ch. vi., § 2). This is an instance of that refusal to acknowledge real existence or essence which weakens Mill's whole position. Moreover, he evidently confines 'existence' to physical existence. He gives as examples to prove his contention: "A ghost is a disembodied spirit" (*ibid.*) and "A dragon is a serpent breathing flame" (*ibid.*, ch. viii., § 5). But in the appropriate sphere—that of imagination—ghosts and dragons *do* exist, and *do* possess the attributes respectively predicated of them.

210. No; for *stop* is not the logical copula. Reducing to logical form we get:—

(1) 'All trains are stoppers at all stations,' etc, where it is seen that 'stop at all stations' is the predicate, and is undistributed.

211. Pp. 215-16.

212. Pp. 216-24.

213. (1) { *a. Some S's are P. (I.)*

{ *b. Some P's are S. (I.)*

(2) { *a. Some S's are not P. (O.)*

{ *b. Some P's are not S. (O.)*


See p. 216 for answer to second part of question.


214. Pp. 216-19.


215. Pp. 219-22.

Hamilton's Scheme employs a wedge-shaped line, thickened towards the subject, to represent the copula of a proposition. A colon (:) between a term and the copula indicates that that term is distributed, and a comma (,) that it is undistributed. A perpendicular stroke drawn through the affirmative copula


expresses negation. This method was used in connexion with the eight-fold scheme resulting from the quantification of the predicate (*see* p. 200). Thus:—


U . SuP ; $S:$  $:P$


A . SaP ; $S:$  $,P$

Y . SyP ; $S,$  $:P$

I . SiP ; $S,$  $,P$

E . SeP ; $S:$  $:P$

η . $S\eta P$; $S:$  $,P$

O . SoP ; $S,$  $:P$

ω . $S\omega P$; $S,$  $,P$

Hamilton himself spoke of this scheme as “easy, simple, compendious, all-sufficient, consistent, manifest, precise, complete.” But, as Dr. Venn remarks, “It does not deserve to rank as a diagrammatic scheme at all, though he does class it with the others as ‘geometric’: but is purely symbolical. What was aimed at in the methods above described was something that should explain itself at once, as in the circles of Euler, or need but a hint of explanation, as in the lines of Lambert. But there is clearly nothing in the two ends of a wedge to suggest subjects and predicates, or in a colon and comma to suggest distribution and non-distribution” (*Symbolic Logic*, p. 432). The scheme certainly does not recommend itself on the ground of beauty, the diagrams are not such as can be rapidly written,

and its claims to be "easy, simple, and manifest" will scarcely be granted by the unprejudiced reader.

216. Pp. 222-4.

217. Pp. (1) 223 ; (2) 220 ; (3) *see* Answer to Ques. 215.

218. Pp. (1) 217 ; (2) 221. For representation of **I** and **O** by Dr. Venn's diagrams, *cf.* p. 347.

219. P. 221, for the first two ; the others only require the shading in different compartments.

In (3) the whole of **P** is shaded, except the top central compartment, where all three circles intersect.

In (4) all **Q** which lies outside the circles **S** and **P** is shaded.

220. Pp. 88, 160-1, 118-20.

221. Pp. 172-3 ; *cf.* p. 257.

222. P. 155 (top) ; *cf.* pp. 13-4 (§ 8, first paragraph).

223. Pp. 17-8, 196-214.

224. Pp. 179-87.

225. Pp. 157 (par. 3), 198-200, 208-9, and partially pp. 200-7.

226. Pp. 200-7.

227. Pp. 225-7.

228. Pp. 227 (i), 228-9 ; *cf.* pp. 240-2.

229. Pp. 229-32.

230. Pp. 232-4.

231. Pp. 234-6.

232. Pp. 236-8.

233. Pp. 238-9.

234. Pp. 239-44.

235. Pp. 226 (bottom)-7. Mill's view sprang from a too objective view of Logic (*cf.* pp. 18, 402-5).

236. Pp. 228-9, 239-44.

(1) It is only the bold who are lucky =

(a) Some of the bold are lucky (**I**) ;

(b) No non-bold are lucky (**E**). It can only be expressed in one proposition by the aid of an Immediate Inference (see p. 179), thus :—

(c) All the lucky are bold (**A**).

(2) Those who escape are very few = Some (most) are not escaped (**O**).

(3) No one is admitted except on business =

(a) Some on business are admitted (**I**) ;

(b) No non-business persons are admitted (E); or, in one proposition (*see* pp. 179-80)—

(c) All admitted are on business (A).

(4) It cannot be that none will fall = Some are sure to fall (I).

237. Dr. Keynes thinks that, if every proposition is taken to necessarily imply the existence of its subject in the universe of discourse, "the ordinary doctrines of Contradiction and Sub-contrariety fail to hold good." For "on this supposition, if either the subject or the predicate of a proposition is the name of a class which is unrepresented in the universe of discourse, or which exhausts that universe, then that proposition is false; for it implies what is inconsistent with fact. It follows that a pair of contradictories as usually stated, and also a pair of sub-contraries, may both be false. For example, *All S is P* and *Some S is not P* both imply the existence of *S* in the universe of discourse. In the case then in which *S* does not exist in that universe, these propositions would both be false." He gives as examples: "No physically incapacitated Frenchmen are bound to perform military service, Some physically incapacitated Frenchmen are bound to perform military service. . . . Then our contention is that if any one declares that no Frenchmen are physically incapacitated, he cannot admit the truth of either of the above propositions" (*Formal Logic*, pp. 192-3).

But these propositions do not seem to express real categorical judgments. Their categorical form is an accident of expression; the *meaning* is hypothetical (*cf. Manual*, Vol. i., pp. 184-5, 186); and thus the non-existence of their antecedents does not affect their contradictory character. It seems that in every case where the judgment is really categorical, the existence of the subject is implied, and therefore one of each pair of contradictories must be true.

On Dr. Keynes' own view—that particulars imply, but universals do not imply, the existence of their subjects—he says that the doctrine of Contradiction is the only part of the theory of opposition which holds. Contradiction is valid: "*All S is P* denies that there is any *S* that is *non-P*; *Some S is not P* affirms that there is some *S* that is *non-P*. It is clear that these propositions cannot both be true; it is also clear that they cannot both be false" (*ibid.*, p. 195). The securing of true contradiction between **A** and **O**, **E** and **I**, is, indeed, regarded by Dr. Keynes as

a very strong argument in favour of this doctrine (*Formal Logic*, p. 206). But Subalternation will not hold, for the particular implies the existence of its subject, whilst the universal does not; hence, the truth of the latter could not involve that of the former. Nor does Contrariety hold. "For if there is no implication of the existence of the subject in universal propositions we are not actually precluded from asserting together two propositions that are ordinarily given as contraries. . . . We may, therefore, without inconsistency affirm both *All S is P* and *No S is P*; but this is virtually to deny the existence of *S*" (*ibid.*, p. 194). In this case, it seems to us, the propositions cannot represent categorical judgments. The essence of a categorical judgment we hold to be the interpretation of some part of reality, and this reality is denoted by the subject. Therefore, if there is no *S*, no really categorical judgment can be made with *S* for its subject. "The ordinary doctrine of Sub-contrariety does not hold good. *Some S is P* and *Some S is not P* are both false in the case in which *S* does not exist" (*ibid.*, p. 196). Here, again, we must object that if our propositions really represent categorical judgments, their subjects necessarily have an existence in the appropriate sphere.

238. Valid conversion requires no proof; it is self-evident. The conversion of affirmative propositions is immediately based on the Principle of Identity; that of **E** requires the Principles of Contradiction and Excluded Middle as well. Proofs have, however, been frequently offered.

Aristotle gives the following indirect proof :—

No S is P, therefore *No P is S*;
for, if not, *Some individual P*, say *Q*, is *S*,
then, as *Q is both S and P*,
it follows that *Some S is P*;

but this is inconsistent with the original proposition, *No S is P*, whose true converse is, therefore, *No P is S*.

The conversion of **E** being thus established, those of **A** and **I** are indirectly proved by its aid. Thus :—

Every S is P, therefore *Some P's are S*;
for, if not, *No P is S*,
therefore (by conversion) *No S is P*;

but this is inconsistent with the original proposition, *Every S is P*,

whose converse must, therefore, be *Some P's are S*. Exactly the same proof is used to establish the converse of **I**.

These seem to require nothing but the Principles of Contradiction and Excluded Middle, but it must be objected that, in the proof of the conversion of **E**, the conversion of **I** is tacitly assumed. For, when it is said that *Q is both S and P* justifies *Some S is P*, it is assumed that, because a certain *P* (i.e. *Q*) is *S*, it follows that *Some S is P*; that is, the simple conversion of **I** is taken for granted. But this latter conversion is itself proved by Aristotle by means of that of **E**. The argument is, therefore, circular, and begs the question; for we cannot assume the validity of the conversion of **I** as part of the proof of that of **E**, and then use the latter to establish the former. But, if the simple conversion of **I** can be proved independently of **E**, then the proof of **E** will hold. Now, every affirmative proposition may be considered as asserting that there are certain things which possess the attributes connoted both by the subject and by the predicate—the class *SP*. Hence, the Principle of Identity justifies the conversion of an affirmative proposition. For, if there are *S*'s which possess the attribute *P*, the Principle of Identity necessitates that some of the objects which possess that attribute are *S*'s. Of course, that principle will not justify us in making any assertion about *all P*, for the original proposition makes no reference to *all P*. If, then, the Principle of Identity warrants us in converting both *S a P* and *S i P* to *P i S*, we may use that conversion in the proof of the simple conversion of **E**. We may, by its aid, also prove the process in a slightly different way. Thus:—

No S is P, therefore No P is S;
for, if not, *Some P is S,*
and, therefore, *Some S is P;*

but this is inconsistent with the original proposition.

The inconvertibility of **O** cannot be shown directly from the Laws of Thought; but only indirectly by proving that *S o P* is compatible with all the propositions *P a S*, *P i S*, *P e S*, and *P o S*, none of which can, therefore, be its converse.

239. Pp. 255–62.

240. Converses:—*Some B is A*; Some wise creatures are men.

Contradictories:—*Some A is not B*; No men are wise.

Contraries:—*No A is B*; none.

241. All B.A.'s, etc., are successful, etc.

Converse (*per accidens*):—Some persons successful, etc., are B.A.'s, etc.

Converse (*obverted*):—Some persons successful, etc., are not non-B.A.'s, etc.

Converse (*by negation* or *contraposition*):—No persons non-successful, etc., are B.A.'s, etc. (See *Manual*, p. 263.)

Contrary:—No B.A.'s, etc., are successful, etc.

Contradictory:—Some B.A.'s, etc., are not successful, etc.

Subaltern:—Some B.A.'s, etc., are successful, etc.

242. (1) Contradictory:—No crystals are cubes.

(2) Contrary of (1):—All crystals are cubes.

(3) Converse of (2):—Some cubes are crystals.

(3) is the simple converse of the original proposition.

243. Pp. 255–6, 263.

244. (a) Proposition = Some that seem happy are not happy.

Contradictory:—All that seem happy are happy.

Converse:—None—an **O** proposition.

(b) Proposition = No sum of two blacks is able to make a white.

Contradictory:—Some sums of two blacks are able to make a white.

Converse:—Nothing able to make a white is the sum of two blacks.

(c) Proposition = James is a striker of John.

Contradictory:—James is not a striker of John.

Converse:—Some (one) striker of John is James.

(d) Proposition = Some * (*or* most) men are vain.

Contradictory:—No * (*or* few) men are vain.

Converse:—Some vain creatures are men.

245. (a) *Most S's are P.*

(b) *Most S's are not P.*

Cf. Note to Answer to Ques. 244.

(c) This would, generally, mean:—Some others said so.

Contradictory:—No others said so.

(d) This may mean:—(1) Exactly three-fourths are successful.

(2) At least three-fourths are successful.

The latter is the *logical* meaning (see *Manual*, p. 173).

* If 'few' is taken strictly, the forms in brackets are the more exact, but they go beyond the traditional forms (*cf.* pp. 174–5).

Contradictories:—(1) More than (*or* less than, *or* not) three-fourths are successful.

(2) Less than three-fourths are successful.

246. P. 234 (ii) *ad fin.*

247. Pp. 255–62, 228–9, 240–3; (a) 258–9; (b) 271–4, 244–7.

248. Pp. 248–51, 251–2, 254–5.

249. Pp. 226, 255, 254 and 251. For relations of these, *see* pp. 226–7, 248–51.

250. *See* Answer to Ques. 238.

251. To find the relations, we must express them as propositions having the same subject and predicate terms:—

$$(1) S o P = S i \bar{P} = \bar{P} i S.$$

$$(2) \bar{S} o P = \bar{S} i \bar{P} = \bar{P} i \bar{S} = \bar{P} o S$$

$$(3) \bar{S} e \bar{P} = \bar{P} e \bar{S} = \bar{P} a S.$$

Therefore (1) and (2) are sub-contraries.

(1) is subaltern to (3).

(2) and (3) are contradictories.

252. Pp. 265–6.

253. P. 251; Answer to Ques. 238. As Contraposition is merely the conversion of an obverse, its validity follows from that of those simpler operations.

Proposition = Every wrong is capable of legal remedy.

Converse:—Some things capable of legal remedy are wrongs.

Contrapositive:—Nothing incapable of legal remedy is a wrong.

254. Pp. 227, 240–3, 248–51, 267, 226–7.

255. (1) $S a P$.

(2) $P o S$. Sub-contrary of the Converse of (1).

(3) $\bar{S} o \bar{P}$. Inverse of (1).

(4) $S e \bar{P}$. Obverse of (1).

(5) $P i S$. Converse of (1).

(6) $\bar{P} o S$. Subaltern of the Contrapositive of (1).

(7) $P a S$. Subalternans of the Converse of (1).

256. All sciences are useful. $S a P$.

This affirms of 'Science' $S i P$ (the subaltern), and all the Educations derivable from $S a P$, with S as subject. It denies (1) $S e P$ and (2) $S o P$, and all the Educations derived from them, with S as subject.

It affirms of P :—(1) $P i S$, and all Educations from it, with P

as subject. It denies of P :— $P e S$ and all the Eductions from it, with P as subject.

It leaves doubtful $P a S$ and $P o S$, and all Eductions from them, with P as subject.

257. No organic beings are devoid of carbon. $S e P$.

We want to know what we can say about \bar{S} and \bar{P} . This is found in:—

- (1) The Contrapositive:— $\bar{P} i S$.
- (2) The Obverted „ :— $\bar{P} o \bar{S}$.
- (3) The Inverse :— $\bar{S} i P$.
- (4) The Obverted Inv. :— $\bar{S} o \bar{P}$.

Translating these, we get:—

- (1) Some things containing carbon are organic.
- (2) Some things containing carbon are not inorganic.
- (3) Some inorganic beings are devoid of carbon.
- (4) Some inorganic beings are not partly composed of carbon.

258. (a) All mercy is unconstrained in its nature (A).

(b) Some persons are great through necessity (I).

(c) All impracticable things are undesirable (A)

(d) All hypocrisy is sublimely speculative (A).

For immediate inferences from these, see pp. 243, 267.

259. (1) All amethysts are precious stones (A).

(2) No great mathematician is without imagination (E).

(3) Some things that glitter are not gold (O).

For inferences, see pp. 243, 267.

260. $\bar{P} a \bar{S} = \bar{P} e S = S e P = S a P$.

$P o \bar{S} = P i S = S i P$.

$P a \bar{S} = P e S = S e P$.

$\bar{P} o \bar{S} = \bar{P} i S = S i \bar{P} = S o P$.

261. Pp. 249 (last par.), 261-2, 263-5.

262. Pp. 15, 225-6.

- (1) Proposition = Hudibras is a smeller of rats (A).
 Converse = Some (one) smeller of rats is Hudibras.
 Obverse = Hudibras is not a non-smeller of rats.
 Contrapositive = No non-smeller of rats is Hudibras.
- (2) Proposition = The longest road is limited (A).
 Converse = Some (one) limited thing is the longest road.
 Obverse = The longest road is not unlimited.

Contrapositive = No unlimited thing is the longest road.

- (3) Proposition = All princes who can sit, etc., are Protestant (**A**).

Converse = Some Protestants are princes, etc.

Obverse = No princes, etc., are non-Protestant.

Contrapositive = No non-Protestants are princes, etc.

- (4) Proposition = Some (most) unasked advice is unacceptable (**I**).

Converse = Amongst (some) unacceptable things is unasked advice.

Obverse = Some (most) unasked advice is not acceptable.

Contrapositive = None.

- (5) Proposition = All oxenless cribs are clean (**A**).

Converse = Some clean things are oxenless cribs.

Obverse = No oxenless cribs are unclean.

Contrapositive = No unclean things are oxenless cribs.

263. Pp. 268-70.

Dr. Thomson, in treating of Immediate Inference by added Determinants, says: "Some mark may be added to the subject and predicate, which narrows the extent of both, but renders them more definite—better *determined*. And from the simple judgment, we may infer that which has the additional mark, provided that the distribution of terms remains unchanged" (*Laws of Thought*, p. 158).

264. Pp. (1) 270; (2) 254-5.

265. (1) Pp. 258-9, 266, 267 (Table) show in what cases the eduction is conditional, when every proposition is regarded as implying the existence of its subject. The conditional character of the contrapositive of **A** follows, of course, upon that of the converse of **E**.

(2) If the view that every proposition implies the existence of both its subject and predicate and also of the contradictory of each is accepted, then, as the existence of every term which occurs in these eductions is regarded as assured, every one of the inferences must be accepted as valid in a categorical form.

(3) If it is held that no proposition directly implies the existence of any of its terms, then the only implication of existence is conditional. An affirmative proposition implies that, if *S* exists, *P* must also exist, and a negative proposition that, if there are any *S*'s, there must be some *P*'s, for if any *S* is not *P* it must be \bar{P} . The latter implication directly involves the validity of obversion. The validity of conversion of **E** also follows; for

$S e P$ merely implies that no SP exists, and, consequently, if there be any P it must be \bar{S} , so that the existence of P necessitates that of \bar{S} , which is the very implication contained in $P e S$. As the contraposition of **A** is a combination of these two valid processes, it is also valid. The invalidity of the conversion of **A** and **I** follows from the conditional implication contained in an affirmative proposition. For $P i S$ implies that if P exists, S also exists, but this is implied neither by $S a P$ nor by $S i P$. From this invalidity it follows that inversion and the contraposition of **E** and of **O** are invalid; for each of these processes involves the conversion of an affirmative proposition. In short, all inferences to universals are valid, and all to particulars are invalid except in the case of obversion.

(4) On the view that particulars imply, but universals do not imply, the existence of their subjects, it is evident that each inferred proposition must be of the same quality as the one from which it is deduced; for we are not justified, on this view, in inferring a particular—which implies existence—from a universal—which does not. Thus, the eductions which, on this theory, are invalid if stated in a categorical form, are the converses of **A**, the contrapositives of **E**, and all inverses.

266. *Cf.* pp. 271–2.

Orig. Prop. **A**. If any man is industrious, he is always successful.

Obverse **E**. If any man is industrious he is never unsuccessful.

Conv. **I**. If a man is successful, he is sometimes industrious.

Ob. Conv. **O**. If a man is successful, he is sometimes not non-industrious.

Contrap. **E**. If any man is not successful, he is not industrious.

Ob. Contrap. **A**. If any man is not successful, he is non-industrious.

Inv. **O**. If a man is not industrious, he is sometimes not successful.

Ob. Inv. **I**. If a man is not industrious, he is sometimes unsuccessful.

267. *Cf.* example on p. 273.

268. Pp. 271–3.

269. P. 274.

270. Pp. 267 (Table A (iii), (iv)); for justification: pp. 262-3, 265; on Added Determinants: pp. 268-70.

271. Pp. 271-3, 186-7, 192, 274.

272. Pp. 255-6; cf. pp. 173 (top), 256-62.

273. Pp. 14-5, 225-7; (1) 227, 228, 240-3; (2) 255-6.

274. Pp. 271-3; note especially 271 (top), 273.

275. Pp. 228-9. The opposition of greatest value is Contradiction (see pp. 232-4).

276. Pp. 275-7.

277. P. 276.

278. Pp. 277-80.

279. Pp. 280-1.

280. Pp. 277-9.

281. Pp. 282-3.

282. Pp. 283-6.

283. For *Nota notæ*, see p. 286.

In accordance with his view that every proposition expresses a relation of whole and part, both in extension and in comprehension (see pp. 198-200; 208-9), Hamilton distinguished two kinds of syllogisms—the Extensive and the Comprehensive or Intensive. For these he gave separate axioms, which differ in no essential respect from the *Dictum de omni et nullo* and the *Nota notæ* respectively.

Whether, however, the syllogism is in the 'quantity' of Extension or in that of Comprehension, we are told that the argument is identically the same; "every syllogism in the one quantity being convertible into a syllogism absolutely equivalent in the other quantity" (*Lect. on Logic*, vol. i., p. 287). To take the example given by Hamilton himself (*ibid.*, p. 270)—

"Every morally responsible agent is a free agent;

Man is a morally responsible agent;

Therefore, man is a free agent."

This is in extension, being based on the assumption that 'man' has the least, and 'free agent' the greatest extension of the three terms. But these relations of whole and part are reversed in the intensive reading [cf. *Manual*, § 28 (v)], and the subject of the conclusion now becomes the major (*i.e.* the greatest) term; and therefore, as the premise containing that term should be stated first, the syllogism in comprehension is (*ibid.*, 273)—

“ Man is a responsible agent ;
 But a responsible agent is a free agent ;

 Therefore, man is a free agent.”

Hence, the only formal difference is in the order of the premises. But this is not very definite, for, as Hamilton himself says, “ the transposition of the propositions of a syllogism affords no modifications of form yielding more than a superficial character ” (*ibid.*, p. 399)—a statement which is utterly inconsistent with making the order of the premises indicate whether the syllogism is in extension or in comprehension. It is usual, therefore, to mark the different values of the copula in the two kinds of reasoning by writing

In Extension.	In Comprehension.
<i>M</i> is contained under <i>P</i> ,	<i>S</i> comprehends <i>M</i> ,
<i>S</i> is contained under <i>M</i> ,	<i>M</i> comprehends <i>P</i> ,
<hr/>	<hr/>
∴ <i>S</i> is contained under <i>P</i> .	∴ <i>S</i> comprehends <i>P</i> .

This is a syllogism in *Barbara*. But in the Second and Third Figures the order of the premises gives no indication of the quantity in which the syllogism is to be read. In each of those figures *M* is included in both the extremes in one quantity, and includes both in the other quantity. There is nothing to determine in which quantity we are to read the argument, and, hence, we are informed that we may regard either of the extremes as the major term, and so draw two conclusions of the forms *S—P* and *P—S*. The Fourth Figure is rejected as a hybrid, in which the reasoning is in comprehension and the conclusion in extension ; for, being interpreted, it reads

All P comprehends M,
All M comprehends S,

 ∴ *Some S is contained under P.*

But, though all syllogisms can be read both in extension and in comprehension, yet it is held that extension predominates in the Second Figure, where the middle term, being predicate of both premises, is most naturally regarded as containing both the extremes under it. In the Third Figure, on the other hand, intension is the more prominent ; for the middle term being subject of each premise is regarded as comprehending both the extremes

under it. In the First Figure neither predominates, as the middle term is subject of one premise, and predicate of the other.

The above is a brief statement of the doctrine. The fundamental argument against it consists in the objections urged against the view of predication on which it is based (*see Manual*, §§ 85 and 87). It is not true that a proposition expresses two judgments—one of inclusion in the whole of extension, and the other of inclusion in the whole of intension; and, therefore, the syllogistic doctrine based on the assumption that it does is unwarranted and unsound. Thus, we must agree with Mill that “the supposed addition to the theory of the Syllogism is a mere excrescence and incumbrance on it. How great the incumbrance is, all are able to judge, who follow our author through the details of the syllogistic logic. He not only finds it necessary to expound and demonstrate every one of the doctrines twice over, as adapted to Extension and to Comprehension, but struggles to express all the fundamental principles in a manner combining both points of view; and is thereby compelled either to state those principles in terms too wide and abstract for easy apprehension, in order that what is laid down respecting wholes and their parts may be applicable to both kinds of wholes (in Extension and in Comprehension), or else to embarrass the learner with the necessity of carrying on two trains of thought at once, in the attempt to apprehend a single principle.”—(*Exam. of Hamilton*, pp. 433-4).

284. Pp. 285-6.

285. (a) *The Contentum contenti*. Leibniz formulated the general axiom of syllogism in language adapted to a purely class-inclusion view of the import of propositions—*Contentum contenti est contentum continentis*. This may be rendered ‘A part of a part is a part of the whole.’ In addition to the objection to the view of predication it assumes, it is open to the further objection that it states the principle of the subalternation rather than that of syllogism.

(b) *Lotze's Axiom*. Lotze, after objecting to the Latin form of the *Dictum* in the words: “This form of expression is as barren as it is correct; for to hold good of *all* is and means from the very first nothing else than to hold good of each one” (*Logic*, Eng. trans., vol. i., p. 100), goes on to express his own opinion of what the general principle of syllogism is. He says: “If, therefore,

anything worth saying is to take the place of this bare tautology, the nature of the universal concept must certainly be substituted for the mere sum of *all*. But in that case the principle cannot really be accurately expressed except in a form which means precisely the same as the disjunctive judgment; viz. whenever a universal P is a mark in a universal concept M , one of its modifications, $p^1 p^2 p^3$, to the exclusion of the rest, belongs to every S which is a species of M ; whenever a universal P is excluded from a concept M , no one of the modifications of P belongs to any S which is a species of M .

“Of this complete law of thought the ordinary expression of the *dictum de omni et nullo* only regards the one and positive part, which . . . cannot by itself be accurately expressed, the general idea, namely, that the particular is determined by its universal: the other and negative part, which defines the manner of this determination, the idea that the particular admits only one specific form of its general predicate to the exclusion of the others, has found only a partial expression in the principle of the excluded middle” (*ibid.*, pp. 100-1). Of course, in this passage, the $p^1 p^2 p^3$ are incompatible with each other in their very nature (*cf. Manual*, p. 190). The whole argument is philosophically correct; it is not an attribute *in general* which we predicate of a subject, but a particular form of the general attribute. When we say ‘Gold is yellow’ we predicate of gold, not *any* yellow, but one certain species of yellow. If this is true of every judgment, it holds with equal, or stronger, force of the union of judgments into syllogisms. If, for instance, we say

All benevolent acts are virtuous,
To tend the sick is benevolent,

 \therefore *To tend the sick is virtuous;*

we, evidently, do not predicate ‘virtuous’ of tending the sick in a general, but in a specific, sense; it is one special kind—limited by the major premise to those which come under the common designation of ‘benevolent’—of virtuous acts which we predicate. And we practically exclude other kinds of virtue in act—*e.g.*, justice or truth—from the predicate. But this limitation is tacit, and is not expressed verbally in the syllogism. It does not seem necessary, therefore, to introduce it into the Axiom of Syllogism, though the remarks of Lotze are important, as they

emphasize a truth which is apt to be overlooked in the ordinary entirely formal treatment of syllogism.

(c) *Kant's Axiom*. Kant thus expressed the axiom of syllogism: "Whatever stands under the condition of a rule stands also under the rule itself" (*Critique of Pure Reason*, 2nd Ed., p. 378). The primary reference here is to the two premises; the major premise is regarded as supplying the rule by means of which the connexion between the predicate and the subject of the conclusion is established. The point of view is, thus, different from that from which the syllogism is regarded in the *Dictum* and other axioms in which the immediate reference is to the terms of the syllogism.

286. Pp. 277-80.

287. Pp. 285-6; 352-3.

288. Pp. 287-8.

289. Pp. 288-95, 297-8.

290. Pp. 295-7.

291. Pp. 291-2.

292. Pp. 289; 302-4. The 'subordinate rules' are the corollaries. Examples can be readily formed from the discussion on pp. 289-98.

293. Pp. 289, 298-302.

294. No valid conclusion can be drawn if either of the Rules I., III., or V., or of Cor. 1 or 3 is violated. Reasons will be found in the discussion of these, see pp. 289-92, 293-5, 302-3, 304. The violation of a Corollary is, of course, also a violation of one of the Rules of the Syllogism, and, therefore, all cases in which no valid conclusion can be drawn from the premises are covered by the fundamental rules of the syllogism.

295. Pp. 293-7; 292-3.

296. If conclusion is affirmative both premises are affirmative (Rule VI.),

and can, therefore, only distribute two terms between them (R. of D.);

one of these must be *S* (Rule IV.);

∴ *M* is only distributed once.

If conclusion is negative one premise only must be negative (Rules V., VI.),

the premises can, therefore, only contain three distributed terms (R. of D.);

one of these is S , and another is P (Rule IV.);

$\therefore M$ is only distributed once.

297. If the major premise is negative, the minor must be affirmative (Rule V.).

If the major premise is affirmative, P is not distributed (R. of D.), and consequently cannot be distributed in the conclusion (Rule IV.),

which must, therefore, be affirmative (R. of D.).

Hence the minor premise is, in this case also, affirmative (Rule VI.);

i.e. The minor premise is always affirmative.

298. If both premises are affirmative, then, as M is distributed in each of them, no other term can be (R. of D.).

If one premise is negative, the premises can between them distribute no more than three terms (R. of D.);

and of these P must be one, as it is distributed in the negative conclusion (Rules VI., IV., R. of D.);

and as M is distributed twice, S is not distributed.

Hence, in no case is S distributed;

i.e. The conclusion is always particular.

299. Let the premises $A + B$ prove C .

Then A is either negative or affirmative—

(1) If A is negative, C is negative (Rule VI.),

$\therefore A + C$ yield no conclusion.

(2) If A is affirmative it only distributes one term (R. of D.)—

(a) If this *is not* the term common to A and C ,

then that common term is undistributed in both A and C (Rule IV.).

$\therefore A + C$ will yield no conclusion (Rule III.).

(b) If the term distributed in A is the term common to A and C , then the other term in A is undistributed (R. of D.);

and that is the term common to A and B , and is, therefore, distributed in B (Rule III.);

B therefore contains a distributed term which is not distributed in $A + C$.

Hence, in no case can $A + C$ prove B .

300. Pp. (1) 302-3; (2) 303-4.

There can be a partial exception to (1) when the premises are Plurative Prepositions. But in that case they have lost their strictly particular character: *see* p. 175.

To (2) there can be no exception.

301. (1) 'This must be the Middle Term (Rule III.).

The Conclusion must be **I**.

One of the premises must be **I**.

The other must be **A**, with **M** as subject.

This gives us: *Darii*, Fig. I.; *Datisi* and *Disamis*, Fig. III.; and *Dimaris*, Fig. IV.

(2) It must be the Middle Term (Rule III.).

The Conclusion must be **I** (Rule IV.).

Both premises must be **A**, with **M** as subject in each.

This gives us:—*Darapti*, Fig. III.

(3) One term must be the Middle Term (Rule III.).

The other may be either the Major or Minor Term.

The Conclusion must be **I**.

The premises will therefore be **A A**, with the Middle Term as the subject of one and the Major or Minor as the subject of the other.

This gives us:—*Barbari* (subaltern), Fig. I., and *Bramantip*, Fig. IV.

(4) The Middle Term must be one.

Only one distribution in the Conclusion;

∴ Three distributions in the premises;

∴ Premises are **E** and **A** (R. of D.);

∴ Conclusion negative (Rule VI.);

∴ Major must be **E** (Rule IV.);

∴ Minor is **A**, with **M** as subject.

This gives us: *Felapton*, Fig. III., and *Fesapo*, Fig. IV.

302. (a) If the Minor premise is negative, the Conclusion must be negative, and therefore not **A**.

(b) If Minor premise is affirmative, the Minor term is undistributed;

∴ the Conclusion cannot be **A** (Rule IV.).

303. It is assumed that the following premises are admitted—

Some moral indignation is good,

All moral indignation is anger-involving;

∴ Some things which involve anger are good.

To say that anger is always an evil is to contradict this conclusion, and cannot therefore be consistently held by one who admits the premises.

304. No foreigners are wounded,
All the English are foreigners;
∴ No English are wounded.

(1) Illicit Major cannot occur, as the Major Term—wounded—is twice distributed.

(2) No foreigners are wounded,
Some English are foreigners;
∴ No English are wounded.

305. Rules of Syllogism. I., III., IV., V., govern the combinations. Hence:

- (1) Do not conjoin (a) two negatives.
(b) two particulars.
(c) two propositions containing only two terms.

(2) In making combinations not forbidden under (1) take as major premise— (a) Each universal,
(b) Each particular,

and in each case add as minor premise every proposition whose combination with the major secures the rules of distribution (IV., V.). The results are:—

$\frac{NaR}{QiN}$	$\frac{NaR}{NiQ}$	$\frac{NaR}{QeR}$	
∴ QiR	∴ QiR	∴ QeN	
$\frac{RaN}{QiR}$	$\frac{RaN}{RiQ}$	$\frac{RaN}{NeQ}$	
∴ QiN	∴ QiN	∴ QeR	
$\frac{QeR}{NaR}$	$\frac{QeR}{QiN}$	$\frac{QeR}{RaN}$	$\frac{QeR}{NiQ}$
∴ NeQ	∴ NoR	∴ NoQ	∴ NoR
$\frac{NeQ}{QiR}$	$\frac{NeQ}{NaR}$	$\frac{NeQ}{RiQ}$	$\frac{NeQ}{RaN}$
∴ RoN	∴ RoQ	∴ RoN	∴ ReQ
$\frac{QiR}{RaN}$	$\frac{QiN}{NaR}$	$\frac{RiQ}{RaN}$	$\frac{NiQ}{NaR}$
∴ NiQ	∴ RiQ	∴ NiQ	∴ RiQ

306. Expressed as syllogisms, these are :—

(a) All reasonable things are purposeful.

No amusements are purposeful (*obverse of original*).

∴ No amusements are reasonable (*do.*).

This is formally valid, being *Camestres*, Fig. II. Materially, of course, the minor premise is false.

(b) May be reduced to two syllogisms :—

(1) No actions of mad people are morally wrong.

The actions of Borgia are the actions of a madman.

∴ The actions of Borgia are not morally wrong.

This is *Celarent*, Fig. I.

(2) Non-wrongdoing under provocation is praiseworthy.

The conduct of Borgia is non-wrongdoing under provocation.

∴ The conduct of Borgia is praiseworthy.

This is *Babara*, Fig. I.

There is here a fallacy due to the ambiguous use of the phrase 'do no wrong.' In (2) this implies moral freedom and responsibility, but in (1) this inability do no wrong is inferred from the absence of that very moral freedom and responsibility. If we avoid this ambiguity, then in (2) the minor premise does not represent the conclusion of (1), for if Borgia cannot be held morally responsible for his actions, it is evident that his 'doing no wrong' does not fall under the major premise. A morally irresponsible being deserves neither blame nor praise for any of his deeds

(c) The formal argument may be expressed by two hypothetical syllogisms :—

(1) If no possibility of wrongdoing, right is necessary,

If no temptation, no possibility of wrongdoing ;

∴ If no temptation, right is necessary.

(2) If right is necessary, it is not moral,

If no temptation, right is necessary ;

∴ If no temptation, right is not moral.

But there is an ambiguity in the use of 'wrong' and 'right.' 'Doing right' or 'doing wrong,' when used in a moral sense, imply choice. Conduct due to necessity cannot be said to be either right or wrong, morally. Therefore, 'doing right' is not a necessity when 'doing wrong' is impossible, but is itself equally impossible—when 'right' is used in its true moral sense. But 'right' and 'wrong' are also used of conduct which conforms—or

fails to conform—to certain received rules of conduct, with no regard to the motives which prompt it. This objective rightness is necessary when objective wrongness is impossible; but it has no necessary connection with moral right and wrong.

307. P. 175, *cf.* p. 173.

308. Pp. 306–7.

I A I in Fig. III.:—

Some cats are domesticated,

All cats are carnivorous ;

∴ Some carnivorous animals are domesticated.

This is legitimate, since it distributes the middle term, and avoids illicit process.

I A I in Fig. I.:—

Some carnivorous animals are domesticated,

All hyænas are carnivorous ;

∴ Some hyænas are domesticated.

Neither major nor minor premise refers to ‘*all* carnivorous animals,’ and, therefore, those spoken of in the major premise may be quite different from those referred to in the minor premise; *cf.* pp. 291–2.

309. Pp. 307–12.

310. Pp. 308–9.

311. Pp. 308–9.

312. A negative conclusion involves a negative premise (R. VI.), and thus the demonstration of the corollary directly applies here. *See* pp. 310–11.

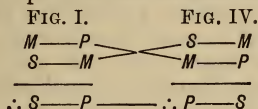
313. *See* p. 314.

(a) *Validity of the Fourth Figure.* Aristotle recognized only the first three Figures, though Ueberweg (*Logic*, Eng. trans., pp. 366–8) has shown grounds for thinking that he practically, though implicitly, included the Fourth Figure in the First. The Fourth Figure is said, by a doubtful tradition derived from Averroes, the Moorish philosopher and translator of Aristotle, of the twelfth century, to have been first explicitly recognized by Galen in the second century. It is, therefore, sometimes called the Galenian Figure. It was not, however, generally admitted into treatises on Logic before the beginning of the eighteenth century, and since then, its admission has been a fertile subject of dispute. Thomson rejects it on the ground of the total in-

version of thought it involves; Hamilton, because he regards it as a hybrid, with the premises in comprehension and the conclusion in extension; and Bowen, partly for the same reason as Thomson, and partly because "it appears that . . . we do not actually reason in the Fourth, but only in the First, and then, if occasion requires, convert the Conclusion of the First" (*Logic*, p. 192). But two of the valid syllogisms in the Fourth Figure have an **O** proposition as conclusion, and as **O** is not the converse of any proposition, Bowen's account will not apply to those syllogisms. Lotze (*Logic*, Eng. trans., vol. i., p. 121) regards the Fourth Figure as "a very superfluous addition to the three figures of Aristotle," as every valid syllogism in that figure can be expressed in either the First or the Third Figure, with "the effect of making the conclusions more natural."

(b) *The Fourth Figure as an Indirect Form of the First.* If we disregard the order of terms in the conclusion we get three figures, but when the distinction between minor and major terms is drawn, the first of these divides into two, the second of which is commonly called the Fourth Figure. It is, thus, to some extent, a matter of minor importance whether we speak of three chief figures, one of which takes two forms, or whether we divide at once into four figures. Aristotle adopted the former plan, but his treatment implies the existence of the Fourth Figure as a subdivision of the First. But the latter plan is formally the more satisfactory, as the order of the terms in the conclusion must be regarded as fundamental in formal syllogism. The names minor and major terms have no meaning except subject and predicate of the conclusion. From this it follows that it is a complete misapprehension of the true syllogistic theory to admit—as Hamilton does, for example—that some syllogisms may have two alternative conclusions of the empty forms $S-P$ and $P-S$. The relation of the extreme terms to each other in the conclusion is definite, and that relation determines which is the major and which the minor premise. Hence, the doctrine held by the early scholastic writers, as well as by some modern logicians, that all the valid syllogisms in the Fourth Figure are merely indirect moods of the First Figure, is open to objection on the ground that it abandons this distinction between major and minor premise, as determined by the position of the extreme terms in the conclusion. For by an indirect mood is meant one in which the major and minor

terms change places in the conclusion. If we compare the schema of the First and Fourth Figures, we see that by transposing the extreme terms in the conclusion of the former we obtain the latter, the order in which the premises are written being quite immaterial.



Mansel (*Aldrich, Art. Log. Rud.*, 3rd Ed., p. 76) makes the further mistake of defining an indirect mood as "one in which we do not infer the immediate conclusion but its converse." With regard to those syllogisms in the Fourth Figure where conclusions are of the form **O**—which is not the converse of any proposition—he says: "They have negative minor premises, and thus offend against a special rule of the First Figure; but this is checked by a counterbalancing transgression. For by simply converting **O**, we alter the distribution of the terms, so as to avoid an illicit process" (*ibid.*, pp. 76-7). One is surprised to find a logician of the acuteness of Mansel speaking of 'counterbalancing' one violation of rule by another as a legitimate piece of logical procedure. His error arose from his too narrow definition of an Indirect Mood; it is not necessary that the conclusion of a syllogism should be logically converted to give the 'indirect mood' of that syllogism, but simply that its terms should change places. In fact, the special rules of the First Figure do not apply to the syllogisms in the Fourth Figure at all, and no manipulation of valid syllogisms in the former figure will give those with an **O** conclusion in the latter. These facts furnish us with additional reasons for rejecting the view that the syllogisms in the Fourth Figure are merely indirect moods of the First. Their conclusions follow from the premises as directly as do those of syllogisms in the First Figure; and whether an argument is in the First Figure or in the Fourth will depend upon which of the extreme terms is the main object of attention—i.e., the subject of the conclusion.

314. Disputes on the value of the distinctions of Figure have turned on two points: (1) whether any figure besides the First is really an independent form of inference; and (2) whether the Fourth Figure should be accepted at all, and if so, whether

as an independent figure or as merely a subdivision of the First Figure. We will consider these questions separately.

(i) *Figure in General.* Several modern logicians have objected to distinctions of figure altogether.

(a) *Kant* wrote a treatise "proving the false subtlety of the four syllogistic figures," in which he maintained that it is "indisputable that all the figures, with the exception of the First, determine their consequences by a circumlocution and a medley of inferences coming in between." In the First Figure only, therefore, he held pure rational inferences to be possible; the inferences in the other figures being mixed with auxiliary judgments. From this it followed that the correctness of a syllogism in one of the other figures could only be tested by reducing it to the First Figure. The answer to this is that as each figure can be referred to an *axioma medium* of its own, this reduction is not necessary to establish the validity of syllogisms in figures other than the First. But, even if it were, this necessity could not destroy the independence of these figures as forms of syllogism; for the definition of a categorical syllogism would still apply to them. As they agree with this definition they must be regarded as forms of syllogism theoretically co-ordinate with the First Figure, though they may be acknowledged to be, practically, of much less importance.

(b) *Hamilton* agrees with *Kant* in considering all other figures as "accidental modifications of the First," and "mutilated expressions of a complex mental process" (*Leet on Log.*, vol. i., p. 433). He chiefly bases his argument on the fact that the "principle that all reasoning is the recognition of the relation of a least part to a greatest whole, through a lesser whole or greater part, is invalidated" (*ibid.*) if any syllogisms other than those in the First Figure are admitted. But the fault is in taking this principle as the most highly generalized statement of the basis of syllogism. *Hamilton's* so-called "simplication" of syllogistic doctrine consists in giving as general principles and rules those which are special to the First Figure, and then in rejecting all other figures because they do not conform to those rules: such a process is merely a *petitio principii* (see *Manual*, vol. ii., pp. 279-85).

Hamilton's later doctrine of the Quantification of the Predicate made figure an immaterial variation, for if every proposition expresses an equation between its terms, the order in which those terms are written is, of course, absolutely unimportant.

(ii) On the Fourth Figure see Answer to Ques. 313.

315. Pp. 307–11.

316. Pp. 307–8, 309.

For Fourth Figure, *see* Answer to Ques. 313.

317. Good in Fig. I. and faulty in Fig. II. **AAA, AII.**

“ “ “ II. “ “ “ “ I. **AEE, AOO.**
Cf. pp. 324–33. For reasons *see* pp. 307–9.

318. *Cf.* Mnemonic Lines, p. 322. For reasons *see* pp. 307–11.

IAI valid in Figs. III., IV.

EIO “ “ every Figure.

319. Pp. (1) 311, (2) 310–11 (Rule 2).

320. *Cf.* Mnemonic Lines, p. 322. For reasons *see* pp. 307–11.

OAO invalid in Figs. I., II., IV.

EIO valid in every Figure.

321. Pp. 307–8.

322. The conclusion must be affirmative (R. of D.),

∴ Both premises must be affirmative (Rule VI.),

∴ *P* must be subject of its premise, to be universal (R. of D.),

∴ Minor premise must be *M a S* (Rule III.).

Hence we get:—

P a M

M a S

∴ *S i P* = *Bramantip*, Fig. IV.

323. Pp. 316 (i); or 319 (i)–20.

AAA in Fig. II. gives Undistributed Middle (*see* Schema and R. of D.).

“ III. “ Illicit Minor “ “ “

“ IV. “ “ “ “ “ “

324. Let *P* = Things of theoretical value.

“ *S* = Things of practical value.

“ *M* = Sciences.

Original statement:—(1) *M a P*

(2) *M a S*

∴ *S i P* = *Darapti*.

Obverse of (1) *M e P̄*

(2) *M a S*

∴ *S o P̄* = *Felapton*.

i.e. *S i P*

In an examination each of these should be expressed in language. It is possible to substitute the subaltern for either premise, without affecting the conclusion, which shows that the original argument is a 'strengthened' syllogism (*cf.* pp. 322-3). By doing this the moods *Disamis*, *Datissi*, *Bocardo*, and *Ferison* are obtained. But these are not strictly expressions of the original argument.

325. Pp. 312-15. On value of Figure, *see* Answer to Ques. 314.

326. Pp. 315, 319-22.

327. Pp. 315-22.

The method of determination by applying the Special Rules of each Figure, though it has the advantage of brevity, is not as scientific as either of those given in the *Manual*. Its results will be seen, on comparison, to be identical with those obtained by the previous methods.

Indirect Determination. The number of valid moods is frequently determined indirectly, by considering every conceivable combination of three propositions, and excluding those which offend against any one of the general syllogistic rules. As there are four forms of categorical propositions, which are to be taken three together, the mathematical doctrine of combinations tells us that the number of conceivable forms of syllogism is sixty-four. Each of these must be tested by the general rules of syllogism, when it is found that all but ten are rejected. This method is extremely clumsy and unscientific. For, as the conclusion is absolutely determined by the premises, it can, in no syllogism, be regarded as an independent element in the combination. It is sufficient, therefore, to decide what combinations of *premises* are legitimate. The number of possible combinations of two premises is sixteen; for a major premise of each of the four forms of proposition—**A, E, I, O**—may be conceived as united with a minor of any one of those forms. Eight of these are excluded by Rule V. or by Cors. 1 and 3. We are, thus, left with eight valid combinations of premises, viz., **AA, AE, AI, AO, EA, EI, IA, OA**. Each of these yields a conclusion in one or more of the syllogistic figures; but the validity of any combination in any particular figure depends upon its securing the correct distribution of the terms, according to Rules III. and IV. An examination of the possible combinations of premises in each of the four figures is, thus, rendered necessary; and this is most readily carried out by applying to them the special rules of each figure.

328. Pp. 322-4; *cf.* 353-5.

329. Pp. 324-8, 331-2, 334-5, 339; *cf.* 353-5.

330. Pp. 323-4. Figure III. can have no weakened moods, as all conclusions in that figure must be particular (*see* p. 309). The premises of *Bramantip* in Fig. IV., if they are transposed, give as conclusion $P a S$. Hence $S i P$ is a weaker conclusion than these premises warrant.

331. **E A O.**

The Conclusion distributes P (R. of D.),
The Major premise distributes M and P (R. of D.),
Therefore this mood is valid in all figures.
E A O is subaltern in Figs. I. and II.

I E O.

The Conclusion distributes P (R. of D.),
The Major premise does not distribute P (R. of D.),
Therefore this mood is invalid in all figures (Rule IV.)

O A O.

The Conclusion distributes P (R. of D.),
Therefore P must be the predicate of the Major premise (Rule IV., and R. of D.),
Therefore M must be the subject of the Minor premise (Rule III., and R. of D.).

This gives us:— $M o P$

$M a S$

$\therefore S o P = \text{Bocardo.}$

This mood, therefore, is only valid in Fig. III.

332. Some national revenue is necessary $M i P$

All national revenue is (derived from) taxation $M a S$

\therefore Some taxation is necessary $\therefore S i P$

333. *Ferio*, Fig. I.

No harmful aggression is justifiable $M e P$

Some wars are harmfully aggressive $S i M$

\therefore Some wars are not justifiable $\therefore S o P$

Festino, Fig. II.

No justifiable actions are harmfully aggressive $P e M$

Some wars are harmfully aggressive $S i M$

\therefore Some wars are not justifiable $\therefore S o P$

Ferison, Fig. III.

No harmful aggression is justifiable $M e P$

Some harmfully aggressive actions are wars $M i S$

\therefore Some wars are not justifiable . . . $\therefore S o P$
Fresison, Fig. IV.

No justifiable actions are harmfully aggressive $P e M$

Some harmfully aggressive actions are wars . $M i S$

\therefore Some wars are not justifiable . . . $\therefore S o P$

334. For Special Rules of Third Figure see p. 309.

(a) *Direct Determination*. By Rule 1 the minor premise is either **A** or **I**. Nothing forbids us from combining every form of proposition with **A**, but with **I** we can only combine universals (Cor. 1 to Gen. Rules). By Rule 2 the conclusion must be particular, and its quality is determined by General Rule VI. Hence, we get **A A I**, **I A I**, **E A O**, **O A O**, **A I I**, **E I O** as the valid syllogisms in Figure III.

(b) *Indirect Determination*. Of the eight valid combinations of premises mentioned in the answer to Question 327, Rule 1 excludes **A E** and **A O**, and six legitimate combinations are left. The quality of the conclusions is decided as in the previous figures, and their quantity by Rule 2. The valid moods of the Third Figure, therefore, are, **A A I**, **I A I**, **A I I**, **E A O**, **E I O**, and **O A O**.

335. Pp. 324-40.

The examples in the *Manual* should be regarded merely as types; each student should find fresh ones. It is a useful exercise to analyse any argumentative passage into its component syllogisms.

336. (1) Pp. 340-1. This assumes that every proposition implies the existence of its subject.

(2). On the view that no proposition implies the existence of either of its terms, the conclusion of an affirmative syllogism implies that the existence of **P** is necessitated by that of **S**, so that if there is any **S** there is some **P**. Similarly, the conclusion of a negative syllogism implies that if there is any **S** there is some *non-P*; i.e., the negative conclusion may, by obversion, be written in the affirmative form with the predicate *non-P*. This conditional implication of existence must be involved in the premises, or the syllogism is invalid. The only forms which secure this are the affirmative moods of the First Figure, in which if **S** exists **M** must exist, and if **M** exists **P** must also exist; and, consequently, the existence of **S** necessitates that of **P**. Therefore, those syllogisms, and those only, are legitimate, whose

premises either are expressed in one of these forms, or can be reduced to one of them by any of the methods of eduction valid on this supposition as to existence. Now, by obverting the major premise in *Celarent* and *Ferio*, and by obverting its converse in *Cesare* and *Festino*—both which processes are valid on this view—we get the major $M a \bar{P}$, whilst the minor is $S a M$ or $S i M$. These moods can, therefore, be reduced to the required form, and are valid. Similarly, by obverting the contrapositive of the major premise in *Camestres*, *Camenes*, and *Baroco*, we get the Form $\bar{M} a P$; whilst, by obverting the minor premise in *Camestres* and *Baroco*, and obverting its converse in *Camenes*, we get either $S a \bar{M}$ or $S i \bar{M}$. Each of these moods, therefore, is legitimate, as each can be reduced to one of the required forms with \bar{M} as the middle term— S ensures \bar{M} which ensures \bar{P} , therefore, if S exists, \bar{P} exists. But in every mood in the Third Figure, and in every mood except *Camenes* (and its subaltern *Camenos*) in the Fourth Figure, S is the predicate of an affirmative proposition. Such a proposition cannot, on this theory, be legitimately converted, and, consequently, none of these moods can be reduced to one of the required forms. Hence, they are all invalid, as S carries a conditional implication of the existence of either P or \bar{P} in the conclusion, which it does not carry in the premises. This invalidity is absolute; for as, on this theory, every conclusion is conditional as to existence, the conclusions in these moods cannot be made legitimate by expressing them in a conditional form, as can be done in the case of *Camenes* on the theory of existential import, which is adopted in the *Manual*. Consequently, on the view we are now considering, the only legitimate moods are those in the First and Second Figures, and *Camenes*, with its subaltern *Camenos*, in the Fourth Figure.

(3) On the view that particulars do, but universals do not, imply the existence of their subjects, the legitimacy of all the moods with universal conclusions may be shown as in the last sub-section. When the conclusion is particular, it definitely implies the existence of S ; this existence must, therefore, be similarly implied in the premises. The assurance of such implication is given directly when S is the subject of a particular minor premise, and indirectly, through M , when it is the predicate of a particular affirmative minor premise. By the special rules

of the figures, the major premise can be particular in the Third and Fourth Figures only, and particular negative in no figure but the Third. Hence, the existence of *M* is implied whenever the major premise is particular. But, in every such case, by Rule V. and Cors. 2 and 3, the minor premise is an *A* proposition, and has *M* for its subject. Thus, the existence of *S* is again implied indirectly through *M*. Consequently, every syllogism with one particular premise is valid. But no mood in which a particular conclusion is drawn from two universal premises can be valid; for in such a case the existence of *S* is unconditionally implied in the conclusion, but not in the premises. The invalid moods, on this theory, are, therefore, *Darapti* and *Felapton* in Figure III., *Bramantip* and *Fesapo* in Figure IV., and all the five subaltern moods. But, in every case, the conclusion is legitimate if stated as conditional on the existence of *S*—*If S exists, then some S's are P*, or *If S exists, then some S's are not P*.

(4) On the view that every proposition implies the existence of both its subject and its predicate, the existence of *S*, *M*, and *P* is in every case guaranteed, and every mood is valid. The supposition is tacitly made in the traditional treatment of syllogism.

337. Pp. 341–7.

338. Pp. 350–1.

339. Pp. 348–50.

340. Let *A* = Confederation formed.

„ *B* = Home trade increases.

„ *C* = Foreign trade increases.

If *B* then *C*,

If *A* then *B*,

∴ If *A* then *C*.

This corresponds to *Barbara*, Fig. I.

341. Let *X* be the major premise, *Y* the minor premise, and *Z* the conclusion of the original syllogism.

Then, *ex hyp.*, *Z* + *Y* give a valid conclusion of the form *M* — *P*.

S is the middle term of this new syllogism, and must, therefore, be distributed (Rule III.);

∴ *S* is distributed in *Y* and also in *Z* if the original syllogism is not weakened (Rule IV.).

But *Y* is affirmative;

for, if it were negative *Z* would also be negative (Rule VI.),

and **Y** and **Z** could not be combined (Rule V.).

Therefore **Y** is $S a M$.

If **X** is affirmative, **Z** is affirmative, and does not distribute **P** (Rule VI. and R. of D.).

Therefore, **Z** is then $S a P$ or $S i P$.

If **X** is negative, **Z** is negative, and distributes **P** (Rule IV.).

Therefore, **Z** is then $S e P$ or $S o P$.

Hence the new syllogism is either

$$\begin{array}{ccccccc} S a P & \text{or} & S i P & \text{or} & S e P & \text{or} & S o P \\ S a M & & S a M & & S a M & & S a M \\ \hline \therefore M i P & & \therefore M i P & & \therefore M o P & & \therefore M o P \end{array}$$

i.e., it is in Figure III., and either **AAI** (*Darapti*) **IAI** (*Disamis*) **EAO** (*Felapton*) or **OAo** (*Bocardo*).

342. Let **P** be original major premise.

„ **Q** be original minor premise.

„ **R** be original conclusion, of the general form $X - Z$.

Let **P**¹ and **Q**¹ denote the logical converses of **P** and **Q** respectively. Then **P**¹ and **Q**¹ together prove conclusion **R**², of the general form $Z - X$.

Therefore, **Q**¹ is major and **P**¹ minor premise of the derived syllogism.

Now, **P** and **Q** cannot both be affirmative; for then both **Q**¹ and **P**¹ would be particular; and neither **P** nor **Q** can be **O**, as that form of proposition is inconvertible; i.e., either **P** or **Q** is an **E** proposition.

Hence, both **R** and **R**² are negative (Rule VI.).

Therefore, **R** distributes **Z**, which must, consequently, be distributed in **P** (Rule IV.); and **R**² distributes **X**, which must, therefore, be distributed in **Q**, as otherwise it would not be distributed in **Q**¹.

The middle term (**Y**) is also distributed in both syllogisms.

Perhaps **Q** and **Q**¹ are **E** propositions ($X e Y$ or $Y e X$); **P** is an **A** ($Z a Y$), and **P**¹ an **I** proposition ($Y i Z$).

Hence, the original syllogism is either *Camestres* (Fig. II.) or *Camenes* (Fig. IV.); and the derived syllogism either *Ferison* (Fig. III.) or *Fresison* (Fig. IV.).

343. (1) p. 314 (iii); (2) p. 313 (ii)-4; (3) p. 312 (i)-3.

344. If the minor premise is negative, the major premise must be affirmative (Rule V.).

But the conclusion must be negative (Rule VI.),
and, therefore, distributes P (R. of D.):

Hence, P must be distributed in the affirmative major premise
(Rule IV.).

i.e., Major premise must be universal (R. of D.).

345. Pp. 352-3.

346. Pp. 353-5.

347. All syllogisms can be reduced to Fig. I.

It is required, therefore, to inquire whether all moods in

Fig. I. can be reduced to *Barbara*.

(1) *Celarent* to *Barbara* by Direct Reduction.

$$\begin{array}{ccc} M e P & \text{---} & \text{by obversion} & M a \bar{P} \\ S a M & & & S a M \\ \hline \therefore S e P & & & \therefore S a P \\ & & \text{i.e., by obversion} & S e P \end{array}$$

(2) *Darii* to *Barbara* by Indirect Reduction.

$$\begin{array}{ccc} M a P \\ S i M \\ \therefore S i \bar{P}; \text{ if not, then } S e P \text{ (obverted Converse)} & P a \bar{S} \\ & \text{(original Major)} & M a P \\ & & \therefore M a \bar{S} \\ & \text{i.e. (converted obverse)} & S e M \end{array}$$

But this contradicts the original Minor, which is given as true.

(3) *Ferio* to *Barbara*, by Indirect Reduction.

$$\begin{array}{ccc} (a) M e P \\ (b) S i M & \text{Obverted converse of (a)} & P a \bar{M} \\ \therefore S o P; & \text{if not, then} & S a P \\ & & \therefore S a \bar{M} \\ & \text{i.e., by obversion} & S e M \end{array}$$

But this contradicts the original Minor, which is given as true.

Or, more briefly, we may reduce *Ferio* to *Darii* directly, in the same way as *Celarent* to *Barbara*. Then we have only *Darii* to reduce indirectly.

It is true, then, that all moods can be really reduced to either *Barbara* or *Darii*, and these do not fundamentally differ from each other (cf. p. 324). But *Darii* and the moods reducible to it cannot really be reduced to *Barbara*, but only proved true by

another syllogism which may be put into *Barbara*. And in the other cases, even when the reduction is done, it still remains true that negation is fundamentally different from affirmation (see p. 324).

348. *Ferison*, Fig. III.

- (1) No selfish person is happy $M e P$
 (2) Some selfish persons are rich $M i S$

∴ Some rich persons are not happy . . . ∴ $S o P$

Reduction to *Ferio*, Fig. I.

- (1) No selfish person is happy $M e P$
 Converse of (2) Some rich persons are selfish . . . $S i M$
 ∴ Some rich persons are not happy . . . ∴ $S o P$

349. *Fesapo*, Fig. IV.:

- (1) $P e M$ Converse of (1) $M e P$
 (2) $M a S$ „ (2) $S i M$
 ∴ $S o P$ ∴ $S o P = Ferio$, Fig. 1.

Celarent, Fig. I.:

- (1) $M e P$ Converse of (1) $P e M$
 (2) $S a M$ „ (2) $M i S$
 ∴ $S e P$ ∴ $S o P = Fesison$, Fig. IV.

Felapton, Fig. III.:

- (1) $M e P$ Converse of (1) $P e M$
 (2) $M a S$ „ (2) $S i M$
 ∴ $S o P$ ∴ $S o P = Festino$, Fig. II.

350. (1) Some truths are not directly useful . . . $M o P$
 (2) Every truth is worthy of being known . . $M a S$
 (3) ∴ Some things worthy of being known are
 not directly useful ∴ $S o P$
 This is *Bocardo*, Fig. III.

Direct Reduction to *Darii* :—

- (2) Every truth is worthy of being known . . . $M a S$
 Contrapositive of (1) Some not-directly-useful things
 are truths $P i M$
 ∴ Some not-directly-useful things are worthy of
 being known ∴ $\bar{P} i S$
 ∴ (by Conv.) Some things worthy of being known
 are not directly useful ∴ $S i \bar{P}$

∴ (by Obv.) Some things worthy of being known
are not directly useful ∴ $S o P$

Indirect Reduction to *Barbara* :—

If (3) is not true, then—Everything worthy of being
known is directly useful $S a P$

and (2) Every truth is worthy of being known $M a S$

∴ Every truth is directly useful ∴ $M a P$

But this contradicts (1), which is given as true.

Therefore, $M a P$ is false, and also $S a P$,

Therefore, $S o P$ is valid, and *Bocardo* is a legitimate mood.

351. Pp. 358–9; 357.

352. **A O O** (1) Every industrious thinker is educated $P a M$

(2) Some successful persons are not educated $S o M$

∴ Some successful persons are not industrious
thinkers ∴ $S o P$

This is *Baroco*, Fig. II.

Ostensive or Direct Reduction to *Ferio*, Fig. I. :—

Converted obverse of (1) No uneducated persons are
industrious thinkers $\bar{M} e P$

Obverse of (2) Some successful persons are un-
educated $S i \bar{M}$

∴ Some successful persons are not industrious thinkers ∴ $S o P$

I A I in Fig. III. (*Disamis*).

(1) Some law judges are impartial $M i P$

(2) All law judges are independent $M a S$

∴ Some independent persons are impartial ∴ $S i P$

Reductio ad Impossibile, or Indirect Reduction to *Celarent*,

Fig. I. :—

If not $S i P$ then $S e P$

(2) $M a S$

∴ $M e P$

But this contradicts the original major premise which
is given as true.

I A I in Fig. IV. (*Dimaris*).

(1) Some domesticated animals are carnivorous $P i M$

(2) All carnivorous animals are naturally savage $M a S$

∴ Some naturally savage animals are domesticated ∴ $S i P$

Indirect Reduction to *Celarent*:—

If not $S \text{ } i \text{ } P$ then $S \text{ } e \text{ } P$
 (2) $M \text{ } a \text{ } S$
 $M \text{ } e \text{ } P$
 (converse) $P \text{ } e \text{ } M$

But this contradicts the original major premise which is given as true.

353. (a) (1) No nervous fluid is able to traverse a tied nerve $P \text{ } e \text{ } M$
 (2) All electricity is able to traverse a tied nerve $S \text{ } a \text{ } M$
 \therefore No electricity is nervous fluid $\therefore S \text{ } e \text{ } P$

This is *Cesare*, Fig. II.

Direct Reduction to *Celarent*, Fig. I.:—

Convert (1) Nothing able to traverse a tied nerve is
 nervous fluid $M \text{ } e \text{ } P$
 (2) All electricity is able to traverse a tied
 nerve $S \text{ } a \text{ } M$
 \therefore No electricity is nervous fluid $\therefore S \text{ } e \text{ } P$
 (b) (1) No men are birds $P \text{ } e \text{ } M$
 (2) All birds are animals $M \text{ } a \text{ } S$
 \therefore Some animals are not men $\therefore S \text{ } o \text{ } P$

This is *Fesapo*, Fig. IV.

Direct Reduction to *Ferio*, Fig. I.:—

Convert (1) No birds are men $M \text{ } e \text{ } P$
 Convert (2) Some animals are birds $S \text{ } i \text{ } M$
 \therefore Some animals are not men $\therefore S \text{ } o \text{ } P$

354. (1) Pp. 359–60. (2) On the view that no proposition implies the existence of either of its terms, the conversion of **A** and **I**, and consequently the contraposition of **E** and **O**, are invalid inferences. No reduction, therefore, which involves either of these processes is valid. This affects every mood in the Third and Fourth Figures except *Camenes*. Nor are the indirect reductions of *Baroco* and *Bocardo* legitimate, as, on this view, contradiction does not hold; for in the case when S does not exist it cannot be said that either of two contradictory assertions made about it is false.

(3) On the view that particulars do, but universals do not, imply the existence of their subjects, the conversion of **A** and, consequently, the contraposition of **E** are invalid. Thus, no reduction

which involves either of these processes is legitimate. This affects *Darapti* and *Felapton* in the Third Figure, and *Bramantip* and *Fesapo* in the Fourth. Hence, neither of these moods can legitimately be reduced.

355. Pp. 358-9.

356. Pp. 360-1.

357. *Ferison*—Fig. III.

Datisi—Fig. III.

$$\begin{array}{rcl}
 M e P & \text{———} & (\text{Obv.}) \quad M a \bar{P} \\
 \underline{M i S} & & \underline{M i S} \\
 \therefore S o P & & \therefore S i \bar{P} \\
 & & (\text{Obv.}) \quad S o P
 \end{array}$$

As both premises of *Barbara* are universal, whilst the minor premise of *Fresison* is particular, the latter cannot be directly reduced to the former. The indirect reduction is—

Fresison—Fig. IV.

Barbara—Fig I.

$$\begin{array}{rcl}
 P e M & \text{———} & (\text{Obv.}) \quad P a \bar{M} \\
 \underline{M i S} & & \underline{S a P} \\
 \therefore S o P & \text{———} & \therefore S a \bar{M} \\
 & & (\text{Obv.}) \quad S e M \text{ which contradicts } S i M, \\
 & & \text{the simple converse of } M i S \\
 & & \text{given as true.}
 \end{array}$$

358. Pp. 362-3.

359. Pp. 363-7.

360. P. 363.

361. Pp. 365, 368-70.

362. P. 370.

363. Pp. 365-7.

364. Pp. 371-3. When 'Disjunctive Syllogisms' are spoken of without the limitation 'Pure' or 'Mixed,' the latter are always referred to (*cf.* p. 350).

365. Pp. 374 (1), (2), (3); 371 (1).

366. Pp. 370 (bottom), 373-4. The distinctions of Figure of pure syllogisms are only indirectly applicable, *i.e.*, they are applicable only when the argument is reduced to categorical form. The true distinction of Figure in Mixed Syllogisms is between *Modus Ponens* (Constructive Syllogisms), and *Modus Tollens* (Destructive Syllogisms); but *cf.* p. 375.

367. This is of the form :—

*If all A is B, some A is C,
No A is C,*

\therefore *No A is B.*

But, since the minor negates the Consequent, the conclusion should be the contradictory of the Antecedent, *i.e.*, *Some A is not B*, or, in the original terms, ‘Some theories of metaphysics are not sound’ (*see pp. 367-8*).

368. Pp. 371-2. The rule of mixed disjunctive syllogism is not directly reducible to the *dictum de omni et nullo*, but rather each is a special statement of the fundamental principles of thought adapted to a special form of reference (*see pp. 371; 285*). That they are consistent with each other is shown by the fact that mixed disjunctive syllogisms can be reduced to categorical form (*see pp. 373-4*).

369. Pp. 373-4. Examples should be given.

370. Pp. 371-3. The Canon is at bottom of p. 372.

371. Pp. 371-3, 375.

372. P. 376. The argument is of the form :—

*If A, then either C or D,
Both \bar{C} and \bar{D} = Neither C nor D*
 \therefore *Not A.*

This does not correspond to the above definition of a Dilemma (*see pp. 381-2*).

373. Pp. 377-9; 384 (iii.).

374. (a) *Negative Forms.* In the *Manual* the examples are confined to cases in which the hypothetical major premise is an affirmative proposition. When the major is negative, the negation is often attached to the connexion between antecedent and consequent, in which case the premise assumes a remote, in place of the usual copulative, form (*see p. 178*). The ordinary form can, however, always be obtained by removing the negative to the consequent—*i.e.*, by obverting the proposition, remembering that the disjunctive and copulative are contradictory forms (*see p. 246*).

To illustrate such negative forms it will be sufficient to give one example. We choose the complex constructive form: ‘Neither if he protests his innocence will I believe him, nor if he implores pardon will I forgive him; but he will either assert his

innocence or beg for pardon; therefore, either I shall not believe him or I shall not pardon him." This is clearly equivalent to: "If he protests his innocence I will not believe him, and if he implores pardon I will not forgive him," etc.

(b) *Wholly Hypothetical Forms.* The disjunctive assertion contained in the minor premise may be itself dependent on another proposition. In this case, both premises are hypothetical, and the conclusion takes the same form, as it can have no greater certainty than the minor premise. Thus, in each form of constructive dilemma the minor may be *If X, then either A or B*, and in the destructive forms it may be *If X, then either not C or not D*. In each case, the conclusion must contain the same hypothesis, *If X*. We will give a few illustrations of such hypothetical dilemmas.

(1) *Simple Constructive.* (a) The inhabitants of any town in an invaded country might argue: "If we are bombarded we shall suffer loss, and if we surrender to the enemy we shall suffer loss; but, if we are besieged, either we shall be bombarded or we shall surrender; therefore, if we are besieged, we shall suffer loss."

(b) "If man's sole duty is to seek his own happiness, or if it is to aim at the greatest happiness of the greatest number, then either no conduct is right or wrong in itself, or some actions must, under all circumstances, have an invariable effect on happiness; but, if Hedonist moralists are right, man's sole duty is to seek either his own happiness, or that of the greatest number; therefore, if that ethical school is right, either all actions are morally indifferent or some are invariably connected with either happiness or misery."

(2) *Simple Destructive.* (a) "If a man acts wisely, he both considers the consequences of his actions and aims at obtaining those which are most beneficial; if a man is carried away by impulse, he either does not consider the consequences of his acts or he does not care what they are; therefore, if a man is carried away by impulse, he does not act wisely."

(b) The example of this form given in the *Manual* (p. 379) becomes an illustration of the fully hypothetical form, if both minor premise and conclusion are made contingent upon some such propositions as 'If experience is to be trusted.'

(3) *Complex Constructive.* A man in a room at the top of a burning house might argue: "If I jump from the window I shall

probably break my neck, and if I attempt to go down the stairs I shall nearly certainly be burnt to death ; but, if a ladder is not soon brought, I must do one or the other ; therefore, if a ladder is not soon brought, I shall probably either break my neck or be burnt to death."

(4) *Complex Destructive*. The example given in the *Manual* (p. 379) of the complex destructive dilemma may have both its minor premise and its conclusion made dependent on the hypothesis 'If there are any unemployed labourers in England,' when it becomes an illustration of the hypothetical form we are now considering.

375. Pp. 376-7, 381-3.

376. Pp. 384-6. For example, *cf.* Answer to Question 374 (a).

377. Several logicians of eminence—as Kant, Hamilton, Bowen, and Bain—have held that the inference in a mixed syllogism is really immediate, and drawn from the major premise alone. As a mixed disjunctive syllogism is reducible to a mixed hypothetical, and as a dilemma is itself a mixed hypothetical syllogism, it will be sufficient to consider this position with respect to those syllogisms which have a hypothetical major premise and a categorical minor.

The main arguments in support of the view that the inference in mixed syllogisms is not mediate are clearly given by Professor Bowen (*Logic*, pp. 264-6). He says: "Their characteristic feature is, that they have no middle term ; the agreement or disagreement of the two terms of the conclusion with each other is ascertained, not by comparing each of them separately with a third term, which is a mediate process, but directly from a single premise, here incorrectly styled a major premise. . . . All the matter which we are reasoning about is embraced in the one complex proposition that is here called the premise ; and all that the reasoner has to do is to explicate or interpret this proposition."

Professor Bain maintains the same position and illustrates it by an example (*Deductive Logic*, p. 117). He says: "'If the weather continues fine, we shall go into the country,' is transformable into the equivalent form, 'The weather continues fine, and so we shall go into the country.' Any person affirming the one does not, in affirming the other, declare a new fact, but the same fact. No new matter is introduced into the assertion ; it is a pure instance of the law of consistency."

This argument appears to rest on a complete misunderstanding

of the difference between a hypothetical and a categorical judgment. The hypothetical major premise merely asserts a connexion between its antecedent and consequent, but does not affirm the actual occurrence of the antecedent. If it did, indeed, what would become of the *Modus Tollens*, whose conclusion denies the occurrence of the antecedent? In Professor Bain's example, surely the original hypothetical premise is in no way equivalent to the categorical proposition into which it is transformed. The statement of a condition will not ensure it, and the dependence of an excursion on fine weather by no means guarantees favourable meteorological conditions. If Professor Bain's argument held, then the hypothetical statement: 'If the nations of Western Europe formed a Federal State under one government, the probability of war would be diminished' would mean that such a federation has actually taken place.

Professor Bowen, having in mind mixed hypothetical syllogisms, says (*ibid.*, p. 265) that the reduction of the major premise to the categorical form "shows very clearly the Immediacy of the reasoning. . . . Thus, *If A is B, C is D*, is equivalent to

All cases of A is B are cases of C is D.
 $\therefore \left\{ \begin{array}{l} \text{Some cases of } A \text{ is } B \text{ are cases of} \\ \text{This case of } A \text{ is } B \text{ is a case of} \end{array} \right\} C \text{ is } D."$

But, if this is so, the categorical syllogism is, equally, an immediate inference: *Every M is P; This (which we call S) is M; $\therefore S$ is P.* In the one case, as well as in the other, a minor premise is required to tell us that we have here a case which comes under the general rule stated in the major. Here, then, we have the proof that the reasoning in a mixed syllogism is mediate; the conclusion cannot be drawn from the major premise alone, but is a result of the combination of that with the minor premise which states a fact. The major, therefore, does not contain "all the matter we are reasoning about"; an essential part of that matter must be sought in the minor, for in the minor only can be found that reference to fact which justifies a categorical conclusion.

But, if this is so, it cannot be true that a mixed syllogism contains no middle term; for a conclusion can only be drawn from the union of two premises when they do contain a common element. Indeed, a more careful consideration of such a syllo-

gism shows that it is not the middle term, but the minor, which is not explicitly stated. This is most clearly seen when the syllogism is reduced to the categorical form, in which the minor premise appears as *This is a case of A*. The minor term is really that reference to fact which is implicit in the categorical form of the minor premise.

Less important arguments in favour of the position that the inference in mixed syllogisms is immediate are that "the minor and the conclusion indifferently change places, and each of them is merely one of the two members constituting the major"; and that "the major (so-called) consists of two propositions, the categorical major of two terms." (Bain, *Deductive Logic*, p. 117).

The latter of these arguments may be dismissed at once as utterly beside the mark. It merely affirms that a mixed syllogism is not of the same form as a categorical syllogism. But the form of the premises has nothing to do with the kind of inference, as is evident from the fact that every proposition in a pure syllogism may be hypothetical.

There is some doubt as to what is meant by the former objection. Taken literally it is false. In the *Modus Ponens* the transposition of minor premise and conclusion would give the fallacy of affirming the consequent; and in the *Modus Tollens* a similar change would lead to denying the antecedent. But it may possibly be intended to mean merely that the subject and predicate of either antecedent and consequent may be, indifferently, subject and predicate either of the minor premise or of the conclusion. If so, the expression is very clumsy, for the same relation is not expressed between them in the two cases, as in one case the proposition is affirmative, and in the other case negative; the minor and conclusion do not, therefore, "indifferently change places."

"It may be added that the argument in its new form is irrelevant. In the categorical syllogism we have something precisely analogous. For given a major premise *All M is P*, a relation between *M* and *S* may be the minor premise (in which case *M* will be the middle term), or it may be the conclusion (in which case *M* will be the major term). Compare the syllogisms: *All M is P*, *All S is M*, therefore, *All S is P*; *All M is P*, *No S is P*, therefore, *No S is M*" (Keynes, *Formal Logic*, p. 308).

Finally, a comparison of a mixed syllogism with true eductions

from hypothetical propositions shows that the conclusions drawn are by no means identical. From *If A, then C*, we can infer, by contraposition, *If not C, then not A*, the obverse of which is *If not C, then not A*. But we are not justified in categorically denying **A**; to do so, we must know that, as a matter of fact, **C** is false. In the *Modus Tollens* this very assertion is made, and the categorical denial of **A** is thereby justified.

378. Pp. 383-4.

379. Pp. 280-1, 362, 363-4. Define both Pure and Mixed Hypothetical Syllogisms, though probably the examiner had the latter only in his mind.

380. Pp. 376 ; 384 (iii.) ; 378 (2), (a).

381. Pp. 363-7.

Second part:—

If X then Y or Z

But not Y

\therefore *If X then Z.*

382. The reference in the question is obviously to Mixed Hypothetical Syllogisms. The rule referred to is on p. 365, and the correspondence to the rule of pure syllogism is shown at bottom of p. 364.

383. Pp. 363-4.

384. P. 376.

If students are industrious, examinations are needless ; if
they are idle, examinations are useless.

Students are either industrious or idle,

\therefore Examinations are either needless or useless.

This may be formally rebutted by:—

If students are industrious, examinations are not useless ; if
they are idle, examinations are not needless.

But students are either industrious or idle,

\therefore Examinations are either not useless, or not needless.

385. (i.) pp. 387-90.

(ii.) **Enthymemes in the Aristotelian Sense.** Aristotle classes the Enthymeme amongst Rhetorical Syllogisms, which are intended to persuade the will rather than to convince the intellect. He defines it as “a syllogism from probable propositions or from signs.” Its imperfection, with him, consisted in its possible informality of reasoning, not, as in the modern sense, in the omission

of one of the constituent propositions; though Aristotle noted this omission as one mode of distinguishing an enthymeme from a full syllogism. By a 'probability' (εἰκός) Aristotle meant a 'moral universal,' i.e., a proposition which is generally, though not quite always, true, as 'Frenchmen are vivacious.' Regarding this as a major premise, and taking as a minor 'This man is a Frenchman,' the enthymematic conclusion would be 'This man is (probably) vivacious.' The argument is formally inconclusive, as the middle term is undistributed. By a 'sign' (σημείον) was meant a singular proposition, from which some other proposition may be supposed to be inferred. In the First or Second Figure the sign must form the minor premise, as that only is singular; in the Third Figure it may be either premise, but is most naturally the major, as then its predicate is the same as the predicate of the conclusion of which it is given as the reason. Both 'probability' and 'sign' may occur in the same enthymeme, but this is not necessary. As examples of enthymemes in which the 'sign' only occurs we may give: (1) 'Nero was cruel, because he was a tyrant;' (2) 'This man is mad, for he talks irrationally;' (3) 'The case of Napoleon the Great shows that all ambitious men are unscrupulous.' If these are expressed in full, by supplying the omitted propositions, they give the following syllogisms, in which the sign is indicated by (Σ):—

- (1) All tyrants are cruel,
 Nero is a tyrant, (Σ)

 ∴ Nero is cruel.
- (2) All mad men talk irrationally,
 This man talks irrationally, (Σ)

 ∴ This man is mad.
- (3) Napoleon is unscrupulous, (Σ)
 Napoleon is ambitious,

 ∴ All ambitious men are unscrupulous.

Of these, the first is formally conclusive, and the 'sign' is there called the 'Proof.' But in the second, the middle term is not distributed; and the third is invalidated by illicit process of the minor term.

Such arguments, however, though formerly inconclusive, are by no means useless rhetorically. They furnish some presumption

of the truth of the conclusion; a presumption which may be indefinitely increased by combining many such enthymemes, all pointing to the same conclusion. Circumstantial evidence is, indeed, merely a series of enthymemes of this kind, in the Second Figure. (*Cf.* vol. ii., pp. 84-5, 66-8, 71-3.)

(iii.) **Derivation of "Enthymeme."** The commonly received derivation of the word 'enthymeme' is ἐν θυμῷ, meaning 'in the mind,' and referring to the fact that one of the premises is understood. On this Mansel (*Aldrich, Art. Log. Rud.*, 3rd Ed., p. 216) says: "That its etymology is to be found in ἐν and θυμός is undeniable. . . . But that it has no special reference to a premise *in the mind* is evident; firstly, because θυμός in the Aristotelian phraseology is not 'the mind,' and has nothing to do with the expression or suppression of premises; secondly, because the word ἐνθύμημα occurs in writers earlier than Aristotle, and before it could have assumed its technical meaning. To ascertain the true derivation, however, is not so easy as to refute a palpably absurd one. . . . According to the analogy of words of the same termination . . . ἐνθύμημα will properly signify the result of an act of reflection. Hence it is used by Sophocles for a *thought suggested* by a person or thing, and by Xenophon for a *plan designed*, opposed to ἔργον, *the execution*. The term is thus naturally enough applicable to the *suggestions* or *persuasive arguments* of Rhetoric, as distinguished from the *demonstrations* of Science."

386. Pp. 390-2.

387. Pp. 393, 394-5.

388. Pp. 393, 397, 398-9.

389. Pp. 396-7.

390. See answer to Question 385.

391. Pp. 393-6.

392. Every lazy man is dull,
 Every dull man is misanthropic,
 Every misanthrope is cynical,
 No cynic is charitable;

∴ No lazy man is charitable.

When expanded the argument becomes:—

(1) Every dull man is misanthropic,
 Every lazy man is dull;

∴ Every lazy man is misanthropic,

- (2) Every misanthrope is cynical.
Every lazy man is misanthropic;

∴ Every lazy man is cynical.
- (3) No cynic is charitable,
Every lazy man is cynical;

∴ No lazy man is charitable,

393. P. 387; answer to Questions 385; pp. 393, 399–400.

Extensive and Intensive are terms applied by Hamilton—not at all appropriately—to the Goclenian and Aristotelian forms of Sorites respectively (see p. 394; *cf.* answer to Question 283). Construct material examples of the forms on p. 393.

394. These men are Jews; therefore, they are shrewd business men.

This is an Enthymeme of the First Order, since it has the major premise omitted.

- (a) Every Jew is shrewd in business,
These men are Jews ;

∴ These men are shrewd in business.

This is a syllogism of the mood A A A, Fig. I. (*Barbara*).

- (b) Every Jew is shrewd in business, because of his training,
These men are Jews;

∴ These men are shrewd in business.

This is a *Single* Epicheirema, since only the major premise has a reason given in support of it.

- (c) Every able man is shrewd in business,
Every well-trained man is able,
Every Jew is well trained,
These men are Jews ;
∴ These men are shrewd in business.

This is a *Goclenian* Sorites, since the suppressed conclusions are the major premises of the following episyllogisms.

395. Pp. 400-1,

396. (a) reduces to the following :—

Free trade is trade-increasing,
 Every increase of trade is price-lowering,
 Every fall in prices is money-value-raising,
 Every rise of money-value is real-wage-raising,
 Every rise in real wages is advantageous to working men ;

∴ Free trade is advantageous to working men.

This is a valid Aristotelian Sorites.

(b) reduces to :

Every thief is dishonest,
 Every dishonest person is immoral,
 Some immoral persons are not punished ;

∴ Some thieves are not punished.

This is an invalid Aristotelian Sorites, since it has one premise, other than the first, which is particular, and thus involves Undistributed Middle (*see* p. 396–7).

397. (a) May be expressed as an Enthymeme of the Third Order :—

No non-receiver is in want,
 Every possessor is a non-receiver ;

∴ No possessor is in want.—Fig. I., *Celarent*.

(b) Is a Mixed Hypothetical syllogism.

If any summer is wet, that summer produces
 a good clover crop,
 This summer is not wet ;

∴ There is not a good clover crop.

It is formally invalid, since it sublates the antecedent. But this antecedent can be shown to be materially essential to the consequent, and, therefore, the simple converse of the major premise is true, and that major is an example of the ideal reciprocal judgments of science (*see* vol. ii., p. 105). Hence, the conclusion is true, but it only follows formally from the premises as given + the additional knowledge of the reciprocal character of the major premise.

(c) The given major premise is *If A then C, and if not A then B (and if B, then C)*. This may be simplified, and the whole

argument expressed as a Simple Constructive Dilemma of the form :—

*If either A or not A, then C,
Either A or not A,*

$\therefore C.$

398. Pp. 402–5.

399. Pp. 402–9.

400. Pp. 405–9, 282–3.

401. P. 408.

402. Pp. 405–9.

403. Pp. 405–9 ; cf. 20–3.

404. Pp. 405–9.

405. Pp. 409–11.

406. Pp. 409–11.

407. P. 409.

408. P. 408 ; cf. 403, 406 (top).

409. 411 (4 and 5) ; cf. generally 409–11.

410. Pp. 410–11.

All references in Answers 411-625, unless otherwise specified, are to Welton's Manual of Logic, Vol. II.

411. Pp. 16-19, 14-16, 19-25.

412. Pp. 10-30.

413. Pp. 1-8, 25-28, cf. 28-31. As to degree of certainty, logical theory must be distinguished from actual scientific practice. The former states the conditions under which an inductive inference is absolutely certain. But it is not the province of logic to say how far those conditions are fulfilled in any particular case; that must be decided by the special science concerned. Owing to the different degrees of perfection with which the logical ideal can be realized, actual inductive inferences are of every degree of strength, from faint probability—as in cases of faint resemblance whose grounds are but partially known—to the absolute certainty of mathematical inductions.

414. Pp. 12-16, 19-25.

415. Everything depends upon the meaning attached to "matters of fact"—see pp. 2-3, cf. p. 49. Nothing is capable of proof or disproof except a judgment, for nothing else can be the expression of a truth or falsity (cf. vol. i., p. 154). A 'fact,' strictly speaking, simply exists. But a statement of a fact is a judgment, and, as such, involves interpretation (cf. vol. i., pp. 14, 159). Such statement is capable of proof or disproof just in so far as it is objective in character. It is evident that a purely personal subjective judgment, such as 'I feel cold,' is not capable of being tested by any person other than he who makes the judgment. But any judgment about the relations of the objective world are capable of being tested by others, and consequently admit of proof or disproof (cf. pp. 3-5).

416. Pp. 19-28. The answer is indirectly contained in these pages. The fully empiricist doctrine—such as Hume held (pp. 12-14)—invalidates all induction, as it makes knowledge impossible. And in so far as empiricism is held, so far induction will be regarded as dependent primarily on enumeration of instances—an enumeration guided more or less by mere external resemblance—and as so dependent, as being essentially incapable of attaining certainty.

417. Pp. 21-3, 8-10; cf. 16-19.

418. Pp. 21-3.

419. Pp. 16-28.

420. Pp. 8-10.

421. Pp. 8-9.

422. Pp. 25 (top)-8. The dictum implies the truth that cause and effect are not separate phenomena, but different aspects of the same; and that the same condition in relation to one set of phenomena may be called 'cause,' in relation to another, 'effect.' Another point brought out—psychological rather than logical—is that passage of mind is usually from cause to effect.

423. Pp. 19, 25-8. Cf. Hobbes' definition, p. 21. Of course *reasons* for definition should be briefly indicated.

424. Pp. 16-23.

425. Pp. 25-8. Natural process is an infinite continuum of infinite complexity,—there are no really separate conditions, in fact, as posited in the law. See especially top of p. 26.

426. Pp. 1-8; *cf.* 12-4.

427. Such a view may be arrived at thus: Experience shows that there are apparent diversities as well as apparent uniformities in nature; strict analysis shows that apparent diversities and uniformities of complex phenomena are only apparent—that in every case there is both uniformity and diversity; hence, if the principle postulates absolute similarity—*i.e.* identity—of complex phenomena, it is reduced to the tautology that events occur as they do occur. Such a view neglects the fact that *in so far as* there is identity there is uniformity, and that such identity is always partial and abstract. It thus ignores the true meaning of 'uniformity of nature,' *i.e.*, the occurrence of identical conditions and sequences in different contexts.

428. Pp. 18-9, 27.

429. Pp. 1, 58; vol. i., pp. 37-8.

430. Pp. 30-1.

431. Pp. 1-5.

432. Pp. 28-30.

433. Pp. 28, 64, 105, 117-18; *cf.* vol. i., pp. 165-6, 185-6, 191

434. Pp. 1-14; *cf.* 40-8.

435. Pp. 5-10.

436. The Unity of Nature, including Uniformity and Principle of Causation; identity of thought experience with reality; and the Principle of Sufficient Reason (*see* pp. 1-31 *passim*).

437. Pp. 5-8.

438. P. 35.

439. The various views as to the nature of induction may all be classed more or less exactly as (a) empirical, based on enumeration, or, (b) rational, based on analysis of content, and proceeding by the method of hypothesis. Each is developed from the doctrine of Aristotle (p. 32). The 'forms' may be exemplified by the Scholastics, Bacon, Mill, and Jevons; 'form' being interpreted to mean 'method' (*see* pp. 32-61 *passim*).

440. Pp. 36-8, 40-8; *cf.* 141-59. Mill's methods of Induction are an advance on Bacon's mainly in that they aim at a thorough examination of content by means of observation and experiment. Mill also recognizes the Deductive Method, which is practically the true scientific method, though he treats it as subsidiary and supplementary rather than primary and essential.

441. Pp. 60-1. All reasoning is inductive or deductive; the latter gives specific results—the former those generalizations on which the specifics rest. There is constant interaction, and every inductive process involves deductive inference [p. 60 (2)]. It is only when 'induction' is confined to the suggestion of generalizations by uniform experience, and is not held to include the verification of those generalizations, that it can be set in sharp antithesis to deduction.

442. Aristotle, pp. 32-3; Bacon, pp. 34-9; Newton, pp. 39-40; Mill, 40-8; and pp. 58-60. Note especially the quotation from De Morgan on pp. 59-60.

443. Pp. 60-1, and see Answer to Question 441.

444. Pp. 58-61.

445. Pp. 32-3; *cf.* p. 68.

446. Mill, pp. 40-8; Jevons, pp. 53-5; *cf.* 58-61.

447. Pp. 33-4, 36, 41-2.

448. Pp. 54-5, 59, 60-1.

449. Pp. 33-4.

450. Pp. 60-1; and see Answer to Question 441.

451. Pp. 35-9, 60.

452. Pp. 58-60.

453. Pp. 35-6, 38.

454. Pp. 55-8.

455. Pp. 32, 37-8, 42.

Whately gives, as an example of inductive syllogism:

That which belongs to this, that, and the other magnet,
belongs to all,

Attracting iron belongs to this, that, and the other magnet ;
Therefore, it belongs to all.

A common form is as follows :—

This, that, and the other X possess y ,

This, that, and the other X are all X 's,

\therefore All X 's possess y .

But in all these attempts induction is regarded as simply empirical generalization from observed instances. The inference from hypothesis which forms an integral part of the full scientific inductive process is, of course, syllogistic.

456. Pp. 48–55.

457. Pp. 39–40, 86.

458. Pp. 42–3.

459. P. 52.

460. Pp. 53–4.

461. Pp. 47–8.

462. Pp. 48–51.

463. Pp. 75–8.

464. Pp. 74–6.

465. Analogy is the main source of hypotheses (*see* pp. 65, 71–4), hence it is most important; but, as the formation of a hypothesis is only the first step in induction, the statement may be regarded as somewhat more emphatic than the facts warrant.

466. The relation is often exhibited thus: In argument by Induction, many things similar in few respects are compared, and generalization made on strength of the number; in Analogy few (only two) things are compared, resembling each other in many respects, and generalization based on strength of degree of similarity ensues.

Such a comparison, however, regards induction as essentially enumerative (*see* p. 63), and the generalizations in both cases are only hypothetical, and no proof from these alone is possible.

The true function of Analogy is the suggestion of hypotheses. (*See* pp. 64–6.)

On proof from analogy, *see* top of p. 75.

467. Pp. 66–70. Where complete enumeration is possible a categorical universal affirmative proposition is obtained—but it is a mere summation of the particulars, and certainly not an induction. It cannot be regarded as reasoning at all. (*See* pp. 33–4, 36, 41–2; *cf.* vol. i., pp. 165–6.)

468. Pp. 62-3.

469. Pp. 62-3.

470. Pp. 80-2; *cf.* 78-80.

471. Pp. 63-6.

472. Pp. 63, 66-8; *cf.* 197-8

473. Pp. 76-80.

474. Pp. 81-2.

475. The first proposition is—

(1) If a bird is male it has bright feathers.

We must also attempt to prove—

(2) If a bird has bright feathers it is male;

and the readiest way of doing this is generally to establish its contrapositive—

(3) If a bird is not male it has not bright feathers, or the contrapositive of (1)—

(4) If a bird has not bright feathers it is not male;

(3) and (4) being simple converses of each other.

Any one of these can only be established or disproved by a complete analysis—*i.e.*, we must find some sufficient reason for a necessary association of sex and degree of brilliancy. (3) and (4) involve negative experiments.

476. Pp. 71-4.

477. Pp. 78-80; *cf.* 76-8.

478. Hypothesis is always of value when it can form the basis of further enquiry; *see* pp. 88-90. It is legitimate to employ any hypothesis which fulfils the conditions given on pp. 95-6. But, of course, the scientific value of a hypothesis increases in direct proportion with the strength of the proof of its validity (pp. 104-8). There are no special rules for analogical reasoning, but the value of an argument from analogy depends on the value of the resemblances, not on their number; *cf.* pp. 74-80.

479. Pp. 95-6. Nothing more definite can safely be formulated. For 'simplicity' *see* pp. 107-8. Simplicity *in statement* is valuable.

480. Pp. 104-5, 82-8, 62-6.

481. Pp. 95-9.

482. Pp. 83-8; legitimacy, pp. 95-6; *Vera causa*, pp. 93-5.

483. Yes. *See* pp. 58-60, 83-5.

484. There is no essential difference in function. But in mathematics the hypotheses deal with ideal constructions in which occur no interfering conditions, and the verification is

similarly ideal and abstract; whilst in physical science the matter dealt with is concrete and complex, open to all kinds of modifying conditions, and depending for verification upon correct analysis of concrete facts. Further, mathematics is preponderatingly deductive in character, and starts from axioms and definitions, hence hypothesis is but little employed; whilst all beginnings of physical science must be by way of hypothesis, as the starting-point must always be particular facts.

485. Pp. 83-6, 88-92.

486. P. 86; *cf.* p. 60.

487. (1) A truly 'invalid' hypothesis is one which does not fulfil the conditions stated on p. 96. Such a hypothesis is worthless. But 'invalid' is often used loosely to denote merely a wholly or partially wrong hypothesis, and in this sense invalid hypotheses frequently lead to valid ones (*cf.* p. 86).

(2) P. 85. A hypothesis must conform to known facts.

(3) Such a hypothesis would be valueless, for all scientific guesses must be founded on facts; and only specialists are likely to formulate valuable hypotheses in any special subjects (*cf.* p. 65).

488. Pp. 104-5.

489. Pp. 90-2.

490. Pp. 86-90.

491. Pp. 105-7. Speak of the *theory* if the principles summed up under the heads may be considered as proved; of the *hypothesis*, if there is any reasonable doubt.

492. Pp. 92-5.

493. Pp. 93-5, 88-9, 102-4, 95-6, 88-90.

494. Pp. 107-8.

495. P. 99.

496. Pp. 100-2.

497. Pp. 124-7, 130-41; *cf.* Hint 2.

498. Pp. 118-20.

499. Induction by simple enumeration is, really, only capable of suggesting hypothesis: *see* pp. 33-4, 66-71; 42-3, 142, 144, 152-3.

500. Pp. 121-2. The reference is most probably to Mill's "Experimental Methods" (*see* pp. 142-4). By the 'ultimate postulate' is meant the principle of Uniformity in Nature. Mill's methods are modes of eliminating unessentials (*see* pp. 147-8), postulating that what is essential must always be cause or effect—that the same phenomenon will always have the same conditions.

501. Pp. 117-22 ; 57.

502. Pp. 142-3, 156-9.

503. Pp. 146-53, especially 147, 152-3.

504. Pp. 114-17. Point out the superior definiteness of experimental inquiry, but the limitations and difficulties of its application to the analysis of mental processes.

505. The function of logic is not to formulate directions for laboratory work, but to analyse and formulate valid processes of inference. Hence, though all discovery of laws of nature proceeds according to the logical methods, and the improvement of those methods enables any one to make more certain of his steps in advancing, yet it would be too much to say that improvement in the theory of logical method has often directly caused conscious scientific progress. It can always be shown that advance has been made by following logical paths, for all accurate thought is logical ; but the particular form the general logical process takes is determined by the necessities and opportunities of the discoverer, and by the character of the subject-matter he deals with. Thus advances in logical analysis of method rather provide a further test of accuracy than directly aid in discovery.

506. Pp. 121-2.

507. Pp. 114-16, 117-22 ; *cf.* 156-9. Examples pp. 122-41 ; *cf.* Hint 2.

508. Pp. 146-56.

509. Pp. 109-22.

510. Pp. 147-8.

511. Pp. 60, 85, 99, 109, 117, 121-2.

512. Pp. 109-22.

513. Pp. 146-56, 157-8.

514. (1) This would rest on testimony, and the chief difficulty would be due to the probable vitiation of observation by excitement, and rapidity of sequence in the occurrences. (2) and (3) are each to some extent matters of experiment, which can be carried out more thoroughly in (3) than in (2). Both negative and positive cases can be examined. The difficulties are due to the probability of the presence of extraneous modifying conditions, and this probability is greater in (2) than in (3). Each instance should be examined in the light of pp. 117-22.

515. (a) By repeating as exactly as he can the experiments he has been engaged in.

(b) By analysing the cases until he finds a difference in the conditions in the successful and the unsuccessful ; *cf.* p. 120.

(c) By hypothesis followed by deduction and verification ; *cf.* pp. 60, 65, 121-2.

516. The reference is probably to Mill's methods. *See* pp. 158-9 ; *cf.* 146-7, 152-6, 156-7.

517. The primary reference is probably to Mill's methods. These are all based on one principle (pp. 147-8), and thus are attempts to state the scientific method of positive and negative instances stated briefly on pp. 121-2. On the logical validity of the methods as formulated by Mill, *see* pp. 152-6.

518. All proof presupposes the principle of unity and uniformity in nature (pp. 5-10).

For rest of answer *see* pp. 141-2, 148-51.

519. Pp. 154-5.

520. Pp. 109-14.

521. Pp. 112-13.

522. Pp. 118-20.

523. Pp. 117-22.

524. P. 122.

525. Examples, *see* pp. 123-30 ; *cf.* Hint 2.

526. Pp. 165-70.

527. P. 162. It is necessary to assume some magnitude (generally arbitrary) in terms of which all results of measurement may be expressed. Such magnitude is the Unit and furnishes the standard of measurement. In a sense a Unit is an absolute standard, and it enables us to express ratios.

528. Pp. 165-70.

529. Pp. 165-70.

530. Pp. 167-8.

(a) This depends upon the ratio of the number of people of the present age of A.B. who have in the past attained the age of 40 to the total number of that age observed. Thus, if out of 10,000 people born x live to the age of A.B. and y live to 40, the probability that A.B. will live to 40 is y/x . This, of course, omits all considerations of the health, constitution, occupation, etc., of A.B., and regards him simply as a unit. The result, therefore, must not be strained beyond this mere numerical estimate.

(b) Pp. 173-4.

531. Pp. 168-9.

532. A coincidence is the occurrence together of any two or more events. The term is chiefly applied colloquially to events whose association is in some way striking, and usually it is implied that they are not causally connected. The probability of the simultaneous occurrence of the events if they are independent can be calculated (pp. 171-4). If the coincidence occurs more frequently than this, some connexion is suggested, and this must be tested in the same way as any other hypothesis. The occurrence of either event without the other is a proof that they are not necessarily connected.

533. See pp. 65-6; *cf.* pp. 143, 145, 156. In all cases where explanation is not complete, residual phenomena will be found. Measurement, as it becomes more perfect and exact, often reveals residual phenomena previously unsuspected; *cf.* p. 133.

534. This was the view held by Jevons (*see* pp. 53-4). But the theory of probability is based upon nothing but mere counting of instances. It is, therefore, possible to deny that induction is based upon that theory, and yet to hold that no actual result of induction is absolutely certain owing to the impossibility of perfectly complete, accurate, and exhaustive analysis of concrete phenomena. But whenever instances are weighed as well as counted, we have passed beyond mere mathematical probability.

536. Pp. 84-5, 171 (b)-6, 178-80. But the 'probability' of an argument can seldom be estimated by the rules of mathematical probability.

537. Pp. 183-5; *cf.* 198-200. The term 'Mean' is wider than 'average,' which is usually employed to denote the arithmetical mean. In addition there are the Geometrical Mean, the Harmonical Mean, and the 'Median' Mean—or the middle one of a series of varied magnitudes.

538. Pp. 163-4.

539. Pp. 165-6.

540. In five cases the wood floats; in two it does not, and in all there are seven possibilities; the chances that he will select one which does not float are, therefore, represented by the fraction $\frac{2}{7}$ when 1 represents certainty.

541. Total number of days 140.

(a) P. of any one night being frosty = $\frac{10}{140} = \frac{1}{14}$;

(b) P. " " " " " new moon = $\frac{1}{28}$;

\therefore P. " concurrence of (a) and (b) = $\frac{1}{14} \times \frac{1}{28}$.

542. P. that A will die within 30 years is $\frac{9}{16}$;

P. „ B „ „ „ 30 „ is $\frac{3}{5}$;

∴ P. both " " " 30 " is $\frac{9}{16} \times \frac{3}{5} = \frac{27}{80}$.

\therefore P. that both will not be dead—i.e. that one at least will be alive $= 1 - \frac{27}{80} = \frac{53}{80}$.

543. There are two hypotheses :—

(i) that both speak truly; (ii) that both speak falsely.

Let P_1 denote antecedent probability (independent of testimony) of drawing a white ball, and P_2 denote antecedent probability of not drawing a white ball.

Then $P_1 = \frac{1}{6}$; $P_2 = \frac{5}{6}$.

Let p_1 = probability that in this case A and B both speak truly,
and p_2 = " " " " " " " " " " " " falsely.

Then $p_1 = \frac{3}{4} \times \frac{7}{10}$; $p_2 = \frac{1}{4} \times \frac{3}{10} \times \frac{1}{25}$;

for if a white ball has not been drawn, the chance that A and B will both select the white ball is $\frac{1}{5} \times \frac{1}{5}$, as there are five different coloured balls left after the drawing.

Hence the probabilities of the two hypotheses are as

$$P_1 p_1 : P_2 p_2, \text{ i.e. as } (\frac{1}{6} \times \frac{3}{4} \times \frac{7}{10}) : (\frac{5}{8} \times \frac{1}{4} \times \frac{3}{10} \times \frac{1}{25}), \text{ i.e. as } 35 : 1.$$

\therefore Probability that statement is true is $\frac{3^5}{3^6}$.

544. As there are 6 multiples of 3, and 2 multiples of 7, in the first twenty numbers,

P. that number drawn is a multiple of 3 = $\frac{6}{20}$.

[illegible]

And these events are mutually exclusive.

\therefore P. that number drawn is a multiple either of 3 or of 7

$$= \frac{6}{20} + \frac{2}{20} = \frac{2}{5}.$$

545. Pp. 182-7.

546. Pp. 183-7.

547. Pp. 200-1; 205; 197-200. Empirical Generalizations
are only probably true.

548. Pp. 197–200; *cf.* 47. Derivative laws are principles obtained by deduction from fundamental laws, and are of less general application. Laws of Nature are the *fundamental* principles (*see* p. 200).

549. Pp. 188–91. Explanation is full statement of the conditions of a phenomenon, proof is the verification of the statement. Just in so far as laws can be proved can things subject to those laws be explained.

550. Pp. 201-5.

551. Pp. 200-7.

552. Pp. 188-91, 201, 207. Mill names three kinds of logical explanations: Resolution of a law of a complex effect, into the laws of the concurrent causes, and the fact of their co-existence: Detection of an intermediate link in a sequence: Subsumption of less under more general laws.

553. Pp. 200-1; 222 (Rule V.), 205-7.

554. Pp. 188-91; *cf.* 28-30.

555. Pp. 202-5.

556. Pp. 197-9. Approximate generalizations are really hypotheses needing complete verification or more exact statement (*cf.* p. 122).

557. Pp. 200-7.

558. A coincidence is the concurrence of phenomena—usually temporal connexion. It is, however, frequently applied to any striking events resembling each other, or curiously associated, yet not supposedly causally connected (*cf.* pp. 171-4). Explanation is simply tracing the conditions which have occasioned both series of phenomena, and so showing whether the events were independent or necessarily connected with each other. See Answer to Question 532.

559. Pp. 188-91, 201, 207. See Answer to Question 552.

560. Pp. 200-7.

561. Pp. 200-7.

562. P. 200; vol. i., p. 30-1.

563. Pp. 200-7. Viewed logically, mathematical and physical necessity do not differ at all. Moral necessity is, from the deterministic standpoint, also merely a case of logical necessity, but is frequently used in sense of absolute demand instead of absolute uniformity. See under *Law*, p. 200.

564. P. 196; 212-13.

565. Pp. 200-7, 222 (Rules III. and IV.), 62. A Theorem is a derivative truth stated as requiring demonstration.

566. Pp. 188-90.

567. Pp. 188-97.

568. Pp. 208-9.

569. Pp. 190-1.

570. Pp. 209-10.

571. Pp. 192-3.

572. Pp. 205-6.

573. Pp. 197-8.

574. Pp. 205-7.

575. P. 221 (Rules I., II.); see also vol. i., pp. 134-53, especially 146-53.

576. P. 220.

577. P. 212, and vol. i., pp. 60-4.

578. Pp. 225-6.

579. P. 221. Definition is treated in vol. i., Book I., on Terms (pp. 107-22).

This is justifiable in that—

(1) Terms require definition.

(2) Definition is closely allied to such subjects as the Predicables and Connotation, both of which are necessarily treated under this head.

580. (a) Pp. 214-15.

(b) Pp. 200-7.

581. Pp. 212-14. The first procedure is by method of analysis, the second by that of synthesis.

582. Pp. 212-14.

583. Vol. i., pp. 127, 134-50. Kinds, vol. i., pp. 83, 136.

584. Deductive inference is synthetic, and in leaving analysis to Induction may be considered hypothetically necessary: *i.e.*, its formal validity does not depend upon the truth of the general propositions from which it starts. *If* they are true, the conclusion is necessarily true. But the rules are more than mere rules of formal consistency: *cf.* vol. i., p. 11. The general rules of method (pp. 214-15), and the special rules of synthetic method (pp. 221-2), apply to deductive inference, and, hence, in the widest and best sense deduction cannot be said to be indifferent to truth.

585. Pp. 114-17. Reference is doubtless intended to the method of agreement (p. 142), but the essence of all inductive method is the same (*cf.* pp. 121-2).

586. Pp. 212-14: *cf.* vol. i., pp. 390-2.

587. Pp. 221 (Rules I., II.), 223; vol. i., pp. 1-9; 107-8, 146-53. The latter part of the question involves somewhat wide treatment, and no special references can be given. Many fallacies are due to some form of confusion in the use of words (*cf.* pp. 237-52).

588. Pp. 117-22, 141-6, 182-7.

589. Pp. 212-13, 219-21.
590. Pp. 212-13, 219-21. 'Syllogism' appears to be used as typical of all deductions.
591. P. 211 ; vol. i., p. 15.
592. Pp. 211, 214-8.
593. Pp. 222-4.
594. P. 226.
595. Pp. 279-85, 285-90, 255-6, 290-2, 274. For class, see pp. 235-6.
596. P. 35.
597. Pp. 227, 235-6 (*cf.* 230-5), 246-8, 255-6.
598. Pp. 268-70. A metaphor expresses the transference of a word from its ordinary to a peculiar purpose (Jevons). It has no force as an argument, as it proves nothing, and it is always possible for one with a lively imagination to invent metaphorical resemblances. It may suggest hypotheses, but its value in this respect depends upon the degree in which there is a real analogy underlying its metaphorical expression.
599. Vol. i., pp. 225-6, 405-9, *cf.* 30-1, 289, for regulative laws; vol. ii., pp. 58-60, 95-6, 191-7, 200-7. There must always be strict adherence to the rules of valid procedure. Second part of question, *see* pp. 235-6 ; *cf.* 234, 261.
600. Fallacy of Four Terms (p. 260). The middle is ambiguous: in major "bird," in minor "bird product" The minor is also an illicit generalization (pp. 272-4).
601. "*Circulus in demonstrando*," p. 282.
602. "*Ignoratio elenchi*," pp. 285-9.
603. A Sorites (*cf.* vol. I., pp. 393-9). A fallacy of 'ambiguous middle' occurs, in one step 'wicked manners,' *i.e.*, 'rude manners,' is made equivalent to 'wickedness.'
604. "*A dicto simpliciter ad dictum secundum quid*"; pp. 243-4. It seems to be formally valid *as stated*, because of the ambiguity of 'rational': but the rationality which entails responsibility means power of reasoning upon conduct, while the "rationality" in which dogs exceed some men merely refers to acts in particular cases which correspond outwardly more or less with how a really rational being would act. To infer rationality from such acts is the fallacy of affirming the consequent: thus, "A rational being would do the act (x); this dog has done the act (x); therefore, this dog is rational."

605. A dilemma involving the fallacy *a dicto secundum quid ad dictum simpliciter*. The 'whether I answer correctly or not' is the very *secundum quid* which is essential to the case. Thus we may deny the validity of the premises when stated unconditionally. If I am to pass, I am to pass, but *not* whether I answer correctly or not; for passing is dependent upon correct answering.

606. See pp. 231-6.

607. See pp. 227-36.

608. See pp. 231-6.

609. (a) An enthymeme (*cf.* vol. i., pp. 387-90), whose validity depends on the generalization contained in the suppressed premise 'what every scientific biologist accepts is true.' This generalization is illicit (vol. ii., pp. 270-7), and, therefore, though the conclusion may be true, its truth is not decided by the consideration here advanced in its support.

(b) Much depends upon the force of the word 'sign.' If it is used in the sense of necessary consequence, or peculiar and characteristic property (*cf.* vol. i., 143-4), then the given premise justifies the given conclusion. But if used only to imply 'ordinary mark,' then there is illicit conversion of a disjunctive proposition. We are only justified in inferring 'Conscientious and healthy people are likely to be good-tempered,' which is, of course, particular. And this must be taken as the only formally valid conclusion, as it is the only one which will cover all uses of 'sign.' The "always" in the given conclusion is, probably, intended merely as a sign of quantity, and equivalent to 'all.' But it is ambiguous, as it may possibly refer to time and be synonymous with 'at all times.' This interpretation gives a further fallacy—*a dicto simpliciter ad dictum s.q.*—in the unauthorized introduction of this new condition.

610. (a) '*Accidens*,' pp. 255-6.

(b) '*Aequivocatio*,' pp. 238-42; *cf.* p. 200.

611. (a) Illicit minor or major, according to form in which the pure hypothetical conclusion is exhibited:—

If truthfulness then never stupidity,

If truthfulness then always scrupulousness;

∴ If stupidity then never scrupulousness [Ill. Major].

or If scrupulousness then never stupidity [Ill. Minor].

(b) P. 249.

(c) Stated syllogistically we have—

All power is desirable;
 Knowledge is productive of power,
 \therefore Knowledge is desirable,

where we see formally four terms. But if we assume that to desire an end is to desire the means to that end, then, as *all* power is stated to be desirable, this involves that *every* means to attain power is desirable, and consequently the conclusion follows from the given premises + this assumption.

612. Pp. 236, 261–77.

613. P. 261; *cf.* pp. 234–6. Inductive fallacies are not formal in their essence, and, therefore, are not regarded as “strictly speaking, logical” by formal logicians (*cf.* p. 233). But in a wider view of logic they are undoubtedly offences against the principles of valid thought, though that offence may originate in the complexity and difficulty of the object of thought.

614. See pp. 285–90, 290–2, 243–6, 250–1, 267–70, 265–7.

615. (a) Valid argument; Fig. II., *Camestres*.

(b) Put syllogistically,—

If A then B,
If B then C;
 \therefore *If C then A.*

Fallacy of affirming the consequent, pp. 256–7; vol. i., p. 364.

(c) ‘*A dicto secundum quid ad dict. simp.*,’ pp., 243–6.

616. See pp. 231–6. Examples of co-operation of errors in production of false theories should not be difficult to reproduce. Mill’s argument for utilitarianism (p. 247) is an instance. *Cf.* also p. 260.

617. ‘*Plures Interrogationes*,’ pp. 254–5.

618. For ‘Non-logical’ see pp. 232–3. It cannot be called rightly a case of ambiguous middle, and it is not the converse of *a dicto secundum quid*; see pp. 255–6.

619. Vol. i., pp. 1–2, 13–15, 154; vol. ii., pp. 2–3. As Kant says: “The senses do not deceive, not because they always judge correctly, but because they do not judge at all.” This is, therefore, a psychological as well as a logical question. The so-called “Fallacies of Simple Apprehension” are regarded by Mill as undue assumption of axioms (see pp. 234, 278–9). Of course

all fallacy involves illicit thought of some kind ; it is necessarily in the *interpretation* of our experiences that error occurs.

620. See pp. 233-4. For illustrations see pp. 279-92 *passim*.

621. See pp. 255-6, 290-2 ; 289.

622. See pp. 237-48.

623. Vol. i., pp. 289, 293-7, 302-3.

(a) A true middle term is secured by the singular subject of both premises. The 'some' in the conclusion is justified because of the logically indefinite character of the word: *cf.* vol. i., pp. 334 ; 167-9.

(b) The argument is valid ; the given minor is the obverse of 'All men are beings not perfectly admirable.' *Cf.* vol. i., pp. 295-7.

(c) See vol. i., p. 175.

624. Pp. 227-9.

625. Pp. 229-30.

Fallacies might be excluded from logic on the ground that logic is a purely natural science concerned only with the analysis of valid thought (vol. i., pp. 10-11 ; *cf.* vol. ii., p. 233). If logic is considered as a normative science—*i.e.*, one concerned with laying down rules or laws (vol. i., p. 12), then fallacies could only be omitted on the ground that directing to the right is *ipso facto* directing from the wrong. But no one can deny the immense utility of pointing out directly probable sources of error ; and, granting this, a classification as thorough and exhaustive as possible necessarily follows in scientific treatment. The advantage of a treatment of fallacies is analogous to the advantage of including negative experiments and instances in the processes of physical investigation.

As logic is the only science which treats of valid thought in general, were fallacies excluded from its scope, a general treatment of them could not be relegated to any other science. Those due to faults of language could be considered in grammar, so far as the fault is one of construction of sentences, but each science would really have to investigate and guard against faults incidental to itself. The treatment of fallacies could not form part of psychology—the other great mental science—as psychology treats of *all* actual mental processes, and an invalid process is as interesting and as valuable psychologically as is a valid one.

In the remaining answers the volume of the Manual referred to is indicated in each case.

626. Vol. i., pp. 80, 81-3, 144.

627. Vol. i., pp. 80-6, 101-2, 157.

Propositions of existence could only come in the classification of the Predicables by regarding 'being' as the highest Genus

628. Vol. i., pp. 68-9, 166-7, 162-3.

629. Vol. ii., pp. 214-5, 221-2 ; *cf.* vol. i., p. 289.

630. Vol. i., pp. 229, 232, 235, 236-7, 251, 261, 282-3.

631. Vol. i., pp. 192-5.

632. Vol. i., pp. 341-6 ; *cf.* 216-9.

633. Vol. i., pp. 65-71, 232-6.

If by "logical" is meant *formal*, then contradiction is more "purely logical" (*ib.*, p. 233) than contrariety, for contrariety involves reference to the matter of the thought. But if "logical" is used in the wider and truer sense (pp. 19-20), then contrariety—or, at any rate, repugnance, which does not differ essentially from contrariety (*ib.*, p. 71)—is the more fundamental, as all negation must rest upon an implied repugnant affirmation (*ib.*, p. 162). Diametrical Opposition is Contradiction ; it is so named from the position of contradictories in the diagram of opposition (*ib.*, p. 240).

634. Vol. i., pp. 40, 159, 197 ; 78 ; 89-90 ; 90 and 103.

635. Vol. i., pp. 83-6 ; 114, *cf.* 111-14 ; 127, *cf.* 134-6, 137, 139-44.

636. Vol. i., pp. 1-3, 10-1, 13-23 ; Vol. ii., pp. 2-3.

637. Vol. i., pp. 107, 109, 205-6 ; *cf.* pp. 112-13.

638. Vol. i., pp. 157-8 ; 28-9.

639. If any proposition whatever is false its contradictory must be true (vol. i., p. 233). Therefore the problem is to show that the contradictories of the premises of a syllogism do not prove the contradictory of the conclusion.

Contradictories differ in quality (*ib.*, p. 232).

Hence—If the original premises are both affirmative their contradictories are both negative, and no conclusion can be drawn (Syll., Rule V. ; *ib.*, p. 289).

But—If the original premises differ in quality the original conclusion is negative (Rule VI.), and its contradictory is consequently affirmative.

And—As the original premises differ in quality so do their

contradictories, which, therefore, cannot establish the affirmative contradictory of the original conclusion (Rule VI.).

640. Vol. i., pp. 352-3; *cf.* 312-5; *cf.* Answer to Question 314.

641. Vol. i., pp. 291-2; *cf.* 282-3.

642. *See* Answer to Question 639.

643. Given that **X** and **Y** prove **Z**, the problem is to prove that **X** and **Z** cannot prove **Y**.

Now, if **Z** is affirmative **X** is affirmative (Rule VI., vol. i., p. 289).

And if **Z** is negative **X** is affirmative, or **X** and **Z** cannot be combined (Rule V.).

∴ **X** can only distribute one term at most.

(i) If **X** distributes the original middle term **M**, the term common to **X** and **Z** is undistributed in both (Rule IV., and Rule of Distrib.);

Hence, in this case the new syllogism is vitiated by the fallacy of Undistributed Middle (vol. i., p. 291).

(ii) If **X** does not distribute **M**, then **M** is distributed in **Y** (Rule III.), which is the conclusion of the new syllogism;

Hence, in this case the new syllogism is vitiated by the fallacy of Illicit Process (vol. i., p. 292).

644. Vol. i., p. 200.

AUI is valid in every figure, for **U** ensures the distribution of **M** in at least one premise. The conclusion is weakened in every figure, as **U** distributes **S** as well as **M**, but **I** does not distribute **S**.

YAY. **Y** distributes its predicate but not its subject, and **A** distributes its subject but not its predicate. Hence, as **P** is distributed in the conclusion, the major premise must be **M_yP**, and the minor must therefore be **M_aP**. Consequently, **YAY** is valid only in Figure III., and the conclusion is not weakened.

UO_η. **U** distributes both **M** and **P**, and the **η** conclusion distributes **S**. Consequently **S** must be distributed in the minor premise, which is, therefore, **M_oS**. The major may be either **M_uP** or **P_uM**. This mood is therefore valid both in Figure III. and in Figure IV., and the conclusion is not weakened.

IU_η. As **U** secures the distribution both of **M** and of **S**, and that irrespective of the orders of terms, this mood is valid in every figure, and the conclusion is not weakened.

AωO. The **O** conclusion demands the distribution of **P**. But as **ω** distributes neither of its terms, and **A** only distributes its

subject, the syllogism must be invalidated in every figure either by Illicit Process of the Major (Figures I. and III.) or by Undistributed Middle (Figures II. and IV.).

645. Vol. i., p. 301 (d).

646. This is really a reciprocal hypothetical proposition, and its simple converse is true in fact. But this truth is not a formal inference from the given proposition, which must, therefore, be converted *per accidens* to 'If two straight lines are parallel, then if another straight line falls upon them it may make the alternate angles equal to each other.' Cf. vol. i., p. 272.

The contrapositive is, 'If two straight lines are not parallel, another straight line falling upon them will not make the alternate angles equal to each other.'

647. Vol. i., pp. 256-7, 258 (bottom); 240-2.

The truth of the converse only involves that of the convertend when the conversion is simple and the existence of the terms is assured. Of course also, in illicit conversion—as of **O**—the truth of neither proposition is guaranteed by that of the other.

The rest of the question is not very exactly stated, for contraries cannot both be true (pp. 234-5), nor can sub-contraries both be false (p. 237). But the truth of either contrary (*i.e.* universal proposition) involves the truth, by subalternation, of the contradictory of the other contrary; and the falsity of either subcontrary (*i.e.* particular proposition) involves the truth, by contradiction, of the contrary of its own subalternans.

648. Vol. i., pp. 278, 312 [§ 115 (i)], 406-7.

649. Vol. i., pp. 7-9; vol. ii., pp. 239-40.

650. Vol. i., pp. 167-9.

651. (i) If both premises are affirmative, both must be universal, and **M** must be the subject of each. Hence, in this case the only possible mood is **AAI** in Figure III. (*Darapti*).

(ii) If one premise is negative the conclusion is negative, and consequently distributes **P**. Hence the major premise must distribute both **M** and **P**—*i.e.*, it must be either **MeP** or **PeM**. The minor premise must still be **MaS**. Consequently the conclusion is particular, and the mood is **EA0**, either in Figure III. (*Felapton*), or in Figure IV. (*Fesapo*).

652. See Answer to Question 283. For a *Datissi* in extension, see vol. i., p. 335. This example can be easily read in comprehension.

653. There is considerable doubt as to the exact meaning of this question. "The opposite" would most naturally be taken to mean the contradictory. But as doubt is thrown on the validity of the new syllogism, "opposite" must be interpreted in a wider sense (*cf.* vol. i., p. 228). For when the contradictory of a conclusion is substituted for a premise the new syllogism is always legitimate, and its conclusion is always the contradictory of the suppressed premise. For if two propositions **P** and **Q** together prove a third **R**, it is plain that **P** and the denial (*i.e.* the contradictory) of **R** together prove the denial of **Q**. For **P** and **Q** cannot be true together without **R** being true also.

Taking the widest meaning of "opposite" we have—

(i) *Opposition in Quality.*

When the new conclusion is *affirmative*, the original conclusion was negative, and its opposite was, consequently, substituted for the original *negative* premise (Rule VI., p. 289). When the new conclusion is *negative*, the original conclusion was affirmative, and, consequently, the suppressed premise was affirmative (Rule VI.).

Hence, in every case, the new conclusion—when one can be legitimately drawn—is opposed in quality to the suppressed premise, or to its converse, according to the order of terms—*i.e.*, according to figure.

(ii) *Opposition in Quantity.*

When the new conclusion is *particular*, the original conclusion was universal, and the suppressed premise, consequently, universal (Cor. 2), and therefore opposed in quantity to the new conclusion.

When the new conclusion is *universal*, the original conclusion was particular, and if one of the original premises was also particular, that has been suppressed (Cor. 2). In this case, therefore, opposition of quality still holds. If both premises of the original syllogism were universal, then there is no opposition in quality between the new universal conclusion and the suppressed premise; but if that premise were an **A** proposition, the opposition exists between its converse (**I**) and the new universal conclusion. But when the suppressed premise is **E** its converse is also universal, and in this case there is no opposition in quality between the new conclusion and either the suppressed premise or its converse.

This last consideration makes it possible that "opposite" in the

question refers to quality alone, but in that case the question is very carelessly worded.

654. The schema of Figure IV. is—

$$\begin{array}{r} P - M \\ M - S \\ \hline \therefore S - P \end{array}$$

- (a) If major is particular, *P* is undistributed (R. of D.);
 \therefore conclusion is affirmative (Rule IV. and R. of D.);
 \therefore both premises affirmative (Rule VI.);
 \therefore minor is universal (Rule III. and R. of D.);
 \therefore The mood is **IAI** (*Dimaris*).
- (b) If minor is particular, *M* is undistributed;
 \therefore major is negative and universal (Rule III., Cor. 1, and R. of D.);
 \therefore minor is affirmative (Rule V.);
 \therefore conclusion is particular (Rule IV. and R. of D.);
 \therefore The mood is **EIO** (*Fresison*).
- (c) If conclusion is universal, *S* is distributed;
 \therefore the minor is negative (Rule IV. and R. of D.);
 \therefore conclusion is negative (Rule VI.) and distributes *P* (R. of D.);
 \therefore major is universal affirmative (Rules V. and IV.), and does not distribute *M* (R. of D.);
 \therefore minor is universal (Rule III.);
 \therefore The mood is **AEE** (*Camenes*).

$$\begin{array}{r} \text{655.} \quad \text{If } A \text{ is not } B, C \text{ is } D \\ \quad \quad A \text{ is } B \\ \hline \therefore C \text{ is not } D. \end{array}$$

This is an invalid mixed hypothetical syllogism, which commits the fallacy of denying the antecedent (vol. i., pp. 363-4).

656. Let *S* = learned; *P* = candid; *M* = acknowledges merit in a rival. The argument is—

$$\begin{array}{r} P a M \\ S o M \\ \hline \therefore S o P \end{array}$$

This is valid, and is **AOO** (*Baroco*) in Figure II.

For Reduction to Figure I. *see* vol. i., pp. 357, 358-9.

657. Only **O** conclusions can be proved in every figure (vol. i., p. 319; *cf.* pp. 316-19).

An **O** conclusion distributes **P**, which must, therefore, be distributed in the major premise. This can only be secured in every figure by the major premise being negative and universal. The major must, therefore, be **E**, which distributes both **P** and **M**. Hence, all the distribution required is secured in the major premise. The minor, which must be affirmative, may, therefore, be **A** or **I**; but when it is **A**, and **S** is the subject, the mood is weakened. Disregarding weakened moods, therefore, the only mood valid in every figure is **EIO**.

658. Vol. i., pp. 19-23, 15, 225, 226, 227, 228, 248, 275.

659. Vol. i., pp. 13-14, 1-3.

660. Vol. i., pp. 200-7.

661. (a) An enthymeme, hiding an ambiguity in the term 'experience.' This is made explicit if the premises are fully stated—

If **A** has had experience (*in teaching*), he is an expert (*in teaching*).

If **A** has been properly taught, he has had experience (*in learning*).

Here there is no true middle term, and, consequently, no conclusion can legitimately be drawn (vol. i., pp. 282-3).

(b) Syllogistically—

Every attempt to combine fact with fiction is impossible,

The historical novel is an attempt to combine fact with fiction;

∴ The historical novel is impossible.

At first sight this appears formally valid, but the middle term is ambiguous, and the inference is, therefore, invalid. The combination of fact with fiction which the major states is impossible is when the fact and the fiction are predicated of identically the same subject (vol. i., pp. 33-4). The combination made in the historical novel is of fact predicated of one subject and fiction of another, and the two placed side by side. This is by no means impossible (p. 34). Hence the apparent syllogism has four terms (vol. i., pp. 282-3; vol. ii., p. 259).

(c) An enthymeme, which expanded runs—

The ultimate end of life is the highest good,

Death is the ultimate end of life ;

∴ Death is the highest good.

Again we have ambiguous middle, for 'ultimate end' in the major means the end of endeavour, the aim or purpose of life ; and in the minor it denotes the conclusion of life. Hence, the apparent syllogism has four terms, and no conclusion can be drawn from the premises.

(d) Stated syllogistically—

If he were guilty, he would have run away,

He has faced his accusers (*i.e.*, he has not run away) ;

∴ He is not guilty (*i.e.*, he is innocent).

There is a valid *Modus Tollens* (vol. i., p. 366).

662. Vol. i., p. 314.

The limitation of the Third Figure to particular conclusions is a consequence of the minor premise being affirmative, and having the minor term for its predicate. Of course this limitation could only be removed—if at all—when both premises are universal (Cor. 2, p. 302). When the minor is $M a S$ its obverse is $M e \bar{S}$. The major is either $M a P$ or $M e P$. To combine $M e \bar{S}$ with $M e P$ or with $M e \bar{P}$ (obverse of $M a P$) is invalid (Rule V., p. 289), and to combine it with $M a P$ or with $M a \bar{P}$ (obverse of $M e P$) leads to illicit major if a conclusion is drawn, for that conclusion must be negative. Hence, the application of obversion to the premises will not render legitimate a universal conclusion in the Third Figure.

663. Vol. i., pp. 409–11.

(a) The premises are—

All not-bad fruit is admitted,

All not-foreign fruit is brought by rail ;

and the conclusion is a valid synthesis of these, for as the fruit is *both* (1) not-bad and (2) not-foreign, it is admitted to market on the ground of (1), and comes by rail on the ground of (2) [*cf.* vol. i., p. 410 (1). On "neither bad nor foreign" = 'both not-bad and not-foreign' (*see ib.*, p. 246)].

(b) This may be expressed—

A or B is always A and B ,

B is sometimes B and C ,

∴ A is sometimes A and C .

This is a valid synthesis of Time and Space (vol. i., p. 411).

(c) The major premise here is **U** (vol. i., p. 200), and the argument may be expressed :—

Class *S* = Class *J*,
 Class *S* includes part of Class *P*,
 ∴ Class *J* includes part of Class *P*.

This is a valid synthesis of identity (vol. i., p. 410).

This argument can be equally well expressed as a syllogism in mood **A A I** in Figure III. :—

$$\begin{array}{c} S a J \\ S i P \\ \hline \therefore P i J \end{array}$$

664. Vol. i., pp. 362–70.

(a) This is a valid *Modus Tollens*, for to sublate part of a compound consequent is to sublate that consequent as a whole (cf. *ib.*, p. 381).

(b) If *F*, then there has been either *R* or *M*,
 There has been neither *R* nor *M* ;
 ∴ There are no *F*.

This is a valid *Modus Tollens* (cf. *ib.*, p. 382).

[NOTE.—“Will be,” in given conclusion, appears to mean “will be found to be at present,” and not to imply a reference to futurity: such a reference would, of course, be invalid unless strictly limited in a way which cannot be stated formally].

(c) This is a dilemma involving the fallacy *a dicto secundum quid ad dictum simpliciter* (vol. ii., pp. 243–6), for the stimulus may be one main cause of the diligence of the serious student, and even the “indifferent” may be still more indifferent without it, unless “indifferent” be used in a very absolute sense (cf. Answer to Question 605). The invalidity is shown by the fact that the dilemma is capable of being thus rebutted (cf. *ib.*, pp 384–5)—

If a student is serious the stimulus is not ineffectual, and if
 he is indifferent it is not unnecessary.

But he is either serious or indifferent ;

∴ The stimulus is always useful.

The minor premise—assumed in the given dilemma—is materially invalid, as the alternative predicates are not exhaustive.

665. Let P = English peer; L = entitled to sit in House of Lords; C = Member of House of Commons; E = elected to parliament.

Then the premises are—

- (i) $P \alpha L$
- (ii) $C \alpha E$
- (iii) $L e E$

(1) Combining (iii) and (i), we get $P e E$,
i.e. No peer is elected to parliament.

(2) Combining (ii) and (iii), we get $L e C$,
i.e. No member of the House of Lords is a member of the House of Commons.

666. The schema of the Third Figure is:—

$$\begin{array}{r} M - P \\ M - S \\ \hline \therefore S - P \end{array}$$

If $S - P$ be substituted for the major premise, S is the middle term of the new syllogism, which is, therefore, in the First Figure.

667. Whenever the middle term is distributed twice in the premises, either universal premise with M for its subject may be replaced by its subaltern. This applies to either premise in Figure III., and to the minor premise in Figure IV., whenever M is distributed in the other premise. Hence, **AAI** in Figure III. (*Darapti*) may become **IAI** (*Disamis*), or **AII** (*Datisi*); **EAO** in Figure III. (*Felapton*) may become **OAo** (*Bocardo*), or **EIO** (*Ferison*); and **EAo** in Figure IV. (*Fesapo*) may become **EIO** (*Fresison*).

Again, when P is distributed in the major premise and not in the conclusion, that major premise is an **A** proposition, and may be replaced by **I** without affecting the conclusion. This only applies to **AAI** in Figure IV. (*Bramantip*), which may become **IAI** (*Dimaris*).

Lastly, in all subaltern moods the universal minor may be replaced by its subaltern without affecting the already weakened conclusion (*cf.* vol. i., p. 323).

To sum up: the moods **AAI** and **EAo** may always have one of their premises replaced by its subaltern without affecting the conclusion.

668. If the premises are both universal affirmative they distribute between them two terms. The conclusion must be affirmative, and may be particular, in which case it distributes no terms.

If one premise is negative and the other affirmative, whilst both are universal, they distribute between them three terms. The conclusion must be negative (Rule VI.), and must, therefore, distribute at least one term, but need not distribute more.

Hence, there may be two universal terms in the premises more than in the conclusion.

669. In every syllogism there are six instances of distribution of terms. The given conditions are, therefore, fulfilled when *M* is distributed once and once only, and one, and one only, extreme term distributed once in the premises and once in the conclusion.

When *S* is this extreme term the conclusion must be affirmative (or *P* would be distributed in it), and each premise must consequently be affirmative, with *S* and *M* for the respective subjects. These conditions are only fulfilled by the mood **AAA** in Figure 1. (*Barbara*).

When *P* is the distributed extreme term the conclusion must be negative and particular. Hence one premise must be negative. If the major is **E** it distributes both *M* and *P*, and the minor must consequently be **I**. This gives the mood **EIO**, which, as each premise is simply convertible, is valid in every figure. If the major distributes *P* only, it is either *P a M* or *M o P*, and the minor in the first case must be *S o M* and in the second case *M a S*, thus giving the moods **A00** in Figure II. (*Baroco*) and **OA0** in Figure III. (*Bocardo*).

670. As the conclusion contains two terms, and the premises four, and no term may be distributed in the conclusion which is not distributed in the premises, and the premises must in addition contain at least one instance of the distribution of the middle term, it follows that in no case can the premises contain more than one undistributed term more than the conclusion.

671. As the middle term must be distributed in the premises it must be the subject of the major premise which must be universal. It may be the predicate of the minor premise

whether that premise is universal or particular, or its subject if it is particular. Hence the moods required are:—

$$\begin{array}{ccc} M a P & M a P & M a P \\ S a M & S i M & M i S \\ \hline \therefore S a P & \therefore S i P & \therefore S i P \end{array}$$

i.e., **AAA** in Figure I. (*Barbara*), and **AI I** in Figures I. and III. (*Darii* and *Datisi*).

672. As the syllogism is negative, *P* as well as *M* must be distributed in the major premise, which is therefore either *M e P* or *P e M*. The minor is affirmative, and *M* may be its predicate, whether the premise is universal or particular, or its subject if it is particular. Hence the moods required are:—

$$\begin{array}{cccccc} M e P & M e P & M e P & P e M & P e M & P e M \\ S a M & S i M & M i S & S a M & S i M & M i S \\ \hline \therefore S e P & \therefore S o P & \therefore S o P & \therefore S e P & \therefore S o P & \therefore S o P \end{array}$$

i.e., **EAE** in Figures I. and II. (*Celarent* and *Cesare*).

EIO in each figure (*Ferio*, Figure I., *Festino*, Figure II., *Ferison*, Figure III., *Fresison*, Figure IV.).

673. This is a valid Complex Destructive Dilemma. [See vol. i., p. 377 (4).]

674. (a) This is a pure hypothetical syllogism—

$$\begin{array}{l} \text{If } X \text{ then sometimes not } Y \\ \text{If } X \text{ then always } Z \\ \hline \therefore \text{If } Z \text{ then sometimes not } Y \end{array}$$

which is the contradictory (or denial) of *If Z then always Y*.

This is valid, and is in the mood corresponding to **OAO** in Figure III (*Bocardo*) (see vol. i., p. 349).

(b) To deduce any predication about *Y* in terms of *Z* is illegitimate, as it would commit the fallacy of illicit major.

This is seen better if the premises are reduced to categorical form (*ib.*, p. 348).

$$\begin{array}{l} X a Z \\ X o Y \end{array}$$

from which nothing follows.

675. If this is possible then the final conclusion may be represented symbolically as either *S a P* or *S e P*.

(1) If it is $S a P$, then the only premises which will justify this conclusion are $M a P$, $S a M$. These are, by hypothesis, the conclusions of the two original syllogisms. Denote the middle term of each of these syllogisms by R . Then the only premise which can possibly be common to these two syllogisms is that containing M and R . But the syllogism whose conclusion is $M a P$ distributes M in this premise, whilst the syllogism whose conclusion is $S a M$ cannot do so. These syllogisms cannot therefore have a common premise.

(2) If the final conclusion is $S e P$, the premises which can give it are—

$M e P$	$P e M$	$P a M$	$P a M$
$S a M$	$S a M$	$S e M$	$M e S$

These are, by hypothesis, the conclusions of the two original syllogisms. Denote the middle term of each of these syllogisms by R . Then the only premise which can possibly be common to these two syllogisms is that containing M and R . But in every case M must be distributed in the syllogism which gives the negative conclusion, and undistributed in that which yields the affirmative conclusion. These syllogisms can never, therefore, have a common premise.

Hence, in no case is it possible that these should be two syllogisms having a common premise such that their conclusions, when combined as premises in a new syllogism, will give a universal conclusion.

676. The conclusion must, of course, be negative, and must therefore distribute P . Hence P and M must be distributed in the premises. If only one of these terms is distributed in each premise, then one premise is particular negative, and the other universal affirmative. Hence $P a M$, $S o M$; and $M o P$, $M a S$ are pairs of premises that fulfil the required conditions. The syllogisms are, therefore, **A O O** in Figure II. (*Baroco*), and **O A O** in Figure III. (*Bocardo*).

677. The three propositions must evidently be all affirmative and all universal (Syll., Rules V. and VI., Cors. 1 and 2), and must contain but three terms, one term being common to each pair of propositions. But affirmative propositions can only distribute their subjects. Hence—

Either (1) each term is distributed only once; and then no

pair of the propositions will prove the third, as it contains a term distributed which is not distributed in the other proposition in which it occurs (Syll. Rule IV.).

Or (2) one term is distributed twice; consequently one term is not distributed at all, and hence the two propositions to which it is common will not yield a conclusion (Syll. Rule III.).

678. Each denial furnishes the minor premise for one or more mixed syllogisms in *Modus Tollens* [vol. i., p. 366 (B)]. Thus—

(1) The denial of **D** sublates **C**, this sublates **B**, and this in turn sublates **A**.

(2) The denial of **C** sublates **B**, and this sublates **A**; but this denial has no effect on the last proposition of the sorites (*ib.*, p. 364).

(3) Similarly, the denial of **B** simply sublates **A**, but has no effect upon the last two links of the sorites.

(4) Lastly, the denial of **A** leaves the whole argument untouched.

679. If **P** is true, **Q** and **R** are both false . . . (b)

But if **Q** is false, **Y** is false . . . (d)

And if **R** is false, **Z** is false . . . (e)

Now, if **Y** and **Z** are both false, **X** is true . . . (a)

∴ If **P** is true, **X** is true.

i.e. (contraposing) If **X** is false, **P** is false . . . (f)

Similarly (g) and (h) may be established.

680. The conclusion must be negative (Rule VI., vol. i., p. 289), and particular (Cor. 2); and the minor premise affirmative and universal with **S** for its predicate—*i.e.*, it is **M a S**;

Hence, the major premise is negative (Rule VI.), and must distribute **P** (Rule IV.). It may therefore be **M e P**, **P e M**, or **M o P**.

The mood of the required syllogism is, therefore, either **EA O** in Figure III. or Figure IV. (*Felapton* or *Fesapo*), or **O A O** in Figure III. (*Bocardo*).

681. The conclusion must be negative (Rule VI.) and particular (Cor. 2); and the major premise affirmative and universal with **P** for its subject—*i.e.*, it is **P a M**;

Hence, the minor is negative and must distribute **M** but not **S**; it is, therefore, **S o M**.

Hence the required syllogism is in the mood **A O O** in Figure II. (*Baroco*).

682. The conclusion must be negative, and therefore distributes *P*;

Hence, *P* must always be distributed in the major premise, no matter what its quality—i.e., the major premise must be universal with *P* for its subject—i.e., it is of the form $P \text{ } \frac{a}{i} \text{ } M$.

Again, *S* must be the subject of the minor premise, or a change of quality will change the quantity of the conclusion—i.e., its form is $S \text{ } \frac{a}{i} \text{ } M$ or $S \text{ } \frac{i}{a} \text{ } M$.

The required syllogism is, therefore, either **A E E** (*Camestres*) or **E A E** (*Cesare*); **A O O** (*Baroco*) or **E I O** (*Festino*) in Fig. II.

683. The conclusion must be negative and the minor affirmative. When the conclusion is universal, the minor must be universal, with *S* for its subject—i.e., it must be $S \text{ } a \text{ } M$. When the conclusion is particular, the minor is either $S \text{ } i \text{ } M$ or $M \text{ } i \text{ } S$. Hence in no case can the minor distribute *M*. Consequently, the major must distribute both *M* and *P*—i.e., be either $M \text{ } e \text{ } P$ or $P \text{ } e \text{ } M$.

Hence, the syllogism is either **E A E** in Fig. I. (*Celarent*) or Fig. II. (*Cesare*), or **E I O**, which, as both premises are simply convertible, is valid in every figure.

684. (1) Either premise may be **A** or **O** as neither of these propositions lose in quantity by contraposition (vol. i., pp. 262–3).

(2) Neither premise can be **I**, as **I** cannot be contraposed (vol. i., p. 263).

(3) If one premise is **E**, the conclusion must not be universal, as **E** loses in quantity in contraposition (*ib.*).

(4) As *M* is subject of both premises in Fig. III., either the simple or the obverted contrapositive must be taken in both cases, or there will be no middle term. In the affirmative moods the simple contrapositives give two negative premises, and the obverted contrapositives give undistributed middle.

(5) In the mood **E A O** in Fig. IV. (*Fesapo*), the contrapositives of $P \text{ } e \text{ } M$ and $M \text{ } a \text{ } S$ give undistributed middle.

(6) Omitting all moods excluded by considerations 2–5, there are left **A A A** in Fig. I. (*Barbara*); **A O O** in Fig. II. (*Baroco*); **E A O** and **O A O** in Fig. III. (*Felapton* and *Bocardo*); **A A I** in Fig. IV. (*Bramantip*), in all of which contraposing both pre-

mises will give the contrapositive of the original conclusion in a non-weakened form,

$$\begin{array}{rcl}
 \text{e.g., Baroco } P a M & \dots \text{ obvd. Contr.} & \\
 S o M & \dots \text{ obvd. Contr.} & \\
 & & \left. \begin{array}{l} M o \bar{S} \\ \bar{M} a \bar{P} \\ \therefore \bar{P} o \bar{S} \\ S o P \end{array} \right\} \begin{array}{l} \text{Bocardo,} \\ \text{Fig. III.} \end{array}
 \end{array}$$

obvd. Contr.

685. The conclusion must be particular and the minor universal, and yet not distribute S : it is therefore affirmative, and S is its predicate—i.e., it is $M a S$;

\therefore the conclusion is affirmative, by hypothesis;

\therefore the major premise is also affirmative, and may be of any form.

Hence, the syllogism is in Fig. III. or Fig. IV., and the mood is **AAI** or **IAI** (*Darapti*, *Bramantip*, *Disamis*, *Dimaris*).

686. One premise must be universal and one particular (Cor. 1, vol. i., p. 302). If both premises are affirmative, M must be the subject of each, or in one of the syllogisms there will be undistributed middle (Rule III.). If one premise is negative, the conclusion must be negative (Rule VI.), and P must, therefore, be always distributed in the major premise; the major premise must, therefore, be negative, and have P for its predicate. The minor premise is, therefore, affirmative, and can only secure the distribution of M when the major is particular by having M for its subject.

Hence, in all cases M must be subject of both premises, i.e., the syllogism must be in the Third Figure, and have premises differing in quantity. The moods fulfilling these conditions are **IAI** (*Disamis*) and **AII** (*Datisi*); **OAO** (*Bocardo*) and **EIO** (*Ferison*).

687. The premises can neither be both affirmative nor both universal, or the new syllogism will offend against Rule V., vol. i. (p. 289), or Cor. 1 (p. 302). Hence, the original premises must be **E** and **I** or **A** and **O**. When both these are changed, both in quality and in quantity, a conclusion of the form of the original conclusion— $S o P$ —can no longer be drawn, as P will not be distributed in the new premises. But, as the order of the premises may be changed, a conclusion of the form $P o S$ can always be drawn.

688. Let \mathbf{X} and \mathbf{Y} be two premises which together prove \mathbf{Z} , and let $\bar{\mathbf{X}}$ and $\bar{\mathbf{Z}}$ denote the contradictories of \mathbf{X} and \mathbf{Z} respectively.

The problem is: When can $\bar{\mathbf{X}}$ and $\bar{\mathbf{Z}}$ yield a valid conclusion \mathbf{Y}_2 ?

Now, any term distributed in a proposition is undistributed in its contradictory, and *vice versa*.

$\therefore \mathbf{Z}$ can be neither affirmative nor universal, or the new syllogism will have either two negative or two particular premisses—i.e., \mathbf{Z} is $\mathcal{S} o P$, and, consequently, $\bar{\mathbf{Z}}$ is $\mathcal{S} a P$.

Next, let a denote the term common to \mathbf{X} and \mathbf{Z} .

Then a cannot be P , for as P is distributed in \mathbf{Z} it would also be distributed in \mathbf{X} , and, consequently, would be undistributed both in $\bar{\mathbf{X}}$ and $\bar{\mathbf{Z}}$, which are the premises of the new syllogism (Rule III.).

$\therefore a$ is \mathcal{S} , and \mathbf{X} is the minor premise, and \mathcal{S} is undistributed in it.

This gives as possible forms of \mathbf{X} — $\mathcal{S} o M$, $M i \mathcal{S}$, $\mathcal{S} i M$, $M a \mathcal{S}$.

But as the middle term (\mathcal{S}) of the new syllogism is distributed twice, and as P —one of the extreme terms—is not distributed in $\bar{\mathbf{Z}}$, it follows that if $\bar{\mathbf{X}}$ is negative it must distribute M , the other extreme term, or the new syllogism will be guilty of illicit major (Rule IV.); but if \mathbf{X} is $M a \mathcal{S}$, $\bar{\mathbf{X}}$ is $M o \mathcal{S}$, in which case M is not distributed;

$\therefore M a \mathcal{S}$ is not a possible form of \mathbf{X} .

\therefore The original syllogism is **A O O** (Fig. II.) or **E I O** (any figure).

Hence \mathbf{X} is particular, and if negative has \mathcal{S} for its subject.

Lastly, as the middle term (\mathcal{S}) of the new syllogism is distributed twice, the conclusion is particular, and is opposite in quality to \mathbf{X} , i.e., identical in quality with \mathbf{Y} .

But \mathbf{Y} was universal (Cor. 1).

Hence, \mathbf{Y}_2 is the subaltern of \mathbf{Y} , or of the simple converse of \mathbf{Y} .

689. The conclusion must be negative, and, therefore, distributes P ,

\therefore the major is affirmative and must distribute P , i.e., the major is universal, with P for subject,— $P a M$;

\therefore the conclusion is universal (*ex hyp.*);

\therefore the minor is universal negative, i.e., is $\mathcal{S} e M$ or $M e \mathcal{S}$;

Hence, the syllogism is in the mood **AEE** in Fig. II. (*Camestres*) or Fig. IV. (*Camenes*).

690. Contradictory propositions are (1) **A** and **O**; (2) **E** and **I**.

(1) When the minor is **O** the conclusion is **O**, and distributes **P**,
 \therefore the major is **P a M**,

\therefore the minor is **S o M** (Rule III.),

and the syllogism is in Fig. II.

But no conclusion in Fig. II. can be affirmative (R. III.),

\therefore when minor is **S a M** the conclusion is still negative.

(2) When the minor is **E**, the conclusion is **E**,

\therefore the major is **P a M**, and the minor **S e M** or **M e S**,

\therefore the syllogism is in Fig. II. or Fig. IV.

When the minor is **I** it does not distribute **M**,

\therefore **M** must be distributed in the major **P — M**,

i.e. the major must be negative,

\therefore the conclusion must be negative.

Hence, in all cases where the minors are contradictories in the same figures, the conclusions are negative, and consequently are not contradictories.

691. (1) If both premises are universal and both affirmative, they distribute two terms between them; whilst a particular affirmative conclusion distributes no terms;

Hence, either the middle term is distributed twice, or one of the extreme terms is distributed in the premises and not in the conclusion.

(2) If both premises are universal, and one negative, they distribute three terms between them, whilst a particular negative conclusion distributes only the major term;

Hence, either the middle term is distributed twice or the minor term is distributed in the minor premise, but not in the conclusion. Consequently, in both cases something superfluous is assumed in the premises.

692. Let **G** = gentlemen; **M** = members of club; **O** = officers; **C** = invited to compete.

Then the sentences stated symbolically are:—

(a) **M a G**

(b) **M o O**

(c) **M a C**

(d) **O a C**

Taking these two and two together—

(1)	(2)	(3)	(4)	(5)	(6)
(b) $M o O$	(c) $M c C$	(a) $M a G$	(b) $M o O$	(b) $M o O$	(c) $M a C$
(a) $M a G$	(a) $M a G$	(d) $O a C$	(c) $M a C$	(d) $O a C$	(d) $O a C$
$\therefore G o O$	$\therefore G i C$	No concl.	$\therefore C o O$	No concl.	No concl.

(1) Is **O A O** in Fig. III. (*Bocardo*).

(2) Is **A A I** in Fig. III. (*Darapti*). The premises in this case may be transposed, and the converse conclusion $G i G$ drawn.

(3) Is invalid, as there is no middle term (Rule I., vol. i., p. 289).

(4) Is **O A O** in Fig. III. (*Bocardo*).

(5) Is invalid because the conclusion would be negative and neither extreme term is distributed; therefore it would involve illicit major (Rule IV.).

(6) Is invalid as the middle term (C), is undistributed in both premises (Rule III.).

The conclusions, therefore, are:—

(1) Some gentlemen are not officers.

(2) or $\left\{ \begin{array}{l} \text{Some gentlemen are invited to compete.} \\ \text{Some invited to compete are gentlemen.} \end{array} \right.$

(3) Some invited to compete are not officers.

693. This is a simple constructive dilemma, vol. i., p. 377 (1) (a).

Its invalidity is shown by the fact that it can be thus rebutted.

If we yield to our passions we have no inward conflict, and are therefore not made unhappy; if we combat them we are not disgraced, and, therefore, not unhappy;

But we either yield to or combat our passions;

\therefore In no case are we unhappy.

The flaw is partly in the false disjunction in the minor, *i.e.*, in assuming that moral life is always either a yielding to passion or a state of actual ever-present conflict, omitting the times of victory which exist even if they are transitory; and partly in the major, in which it is assumed that all conflict is always unmixedly painful. Now, though conflict is *in se* painful, yet effort—which involves some conflict—is an essential condition of the highest pleasure: only unsuccessful conflict is an altogether painful state; in successful conflict the element of pain is merely the sauce which makes the dish of pleasure in conquest more piquant.

694. As the conclusion is negative, P is distributed;

As the major premise is affirmative, and there is no illicit major, it is $P a M$;

As there is no undistributed middle, and the minor is affirmative, it is $M a S$;

As there is no illicit minor, the conclusion is particular.

Hence the syllogism

$$\begin{array}{r} P a M \\ M a S \\ \hline \therefore S o P \end{array}$$

offends against none of the syllogistic rules except VI. (vol. i., p. 289).

The syllogism is in the mood **A A O** in Fig. IV.

695. The unchanged premise must be affirmative (Rule V.);

Change in the quality of one (only) premise involves change in the quality of the conclusion;

\therefore the distribution of P in the conclusion is changed;

\therefore either (1) the distribution of P in the major premise is changed—*i.e.*, the major premise is the one whose quality is changed, and is of the general form $M - P$; *i.e.*, the syllogism is in Fig. I. or Fig. III.; in which case the quality *only* of the conclusion is changed.

or (2) P is distributed in the major premise of the affirmative syllogism, and not in the conclusion, *i.e.*, the major premise is $P a M$;

Then the minor premise must be universal, with M for its subject; and the syllogism is in Fig. IV.;

In this case the quality of either premise may be changed, but when the change is made in the minor the conclusion is altered in quantity as well as in quality.

696. As change in both quality and quantity of a proposition involves change in the distribution of every term, it follows that (1) M must be distributed in the unchanged premise (Rule III.); and (2) that premise must be affirmative (Rule V.) with M for its subject.

But change in quality of the other premise involves change in quality of the conclusion;

\therefore in one conclusion P is distributed;

\therefore the unchanged premise cannot be the major, as only M is distributed in it;

∴ the unchanged premise is the minor, and is *M a S*; i.e., the syllogism is either in Fig. III. or in Fig. IV., and has a particular conclusion;

Hence, the changed premise is the major, and the changes are between (1) **I** and **E**, (2) **A** and **O** (*ex hyp.*);

But **O** cannot be the major premise in Fig. IV. (Rules IV. and VI.);

∴ the changes required are possible only with the moods **I A I**, **E A O** in Figs. III. and IV., and **A A I**, **O A O** in Fig. III.

697. Vol. i., pp. 107-8, 111-12; vol. ii., pp. 191-7, 207-10.

698. Vol. ii., pp. 60, 117-18, 121-2, 160-1; *cf.* 142-4, 151.

699. Vol. ii., pp. 165-70.

700. If the balls were all put into the bag at once, then there are ten combinations possible, viz.—

rrr, rrw, rww, www, wwb, wbb, bbb, bbr, brr, brw;

consequently the probability of *www* is $\frac{1}{10}$ (*cf.* vol. ii., p. 171 (a)). But if the balls were put in one at a time, then the probability that any one of them would be white is $\frac{1}{3}$, as there are three alternatives;

∴ the probability that all three would be white is—

$$\frac{1}{3} \times \frac{1}{3} \times \frac{1}{3} = \frac{1}{27} \text{ [cf. vol. ii., p. 171 (b)-4].}$$

701. Vol. ii., pp. 160-5; *cf.* 55-6, 66-9.

702. Vol. ii., pp. 171-82.

The example is a simple application of the probability of compound independent events (*cf.* pp. 171-4).

703. Vol. ii., pp. 165-70, 66-9, 197-200, 191-4, 53-5.

704. Vol. ii., pp. 48-53.

705. Vol. ii., pp. 5-9, 191-7, 47-8, 35-8.

706. Vol. ii., pp. 198-200.

707. Vol. ii., pp. 117-20, 109-14, 182-7, 57, 161-5.

708. The ground is that the probability of the confusion of names so closely resembling each other is much greater than the probability of the coincidence of the death of two men so similarly named occurring on the same day (*cf.* vol. ii., p. 180, on testimony).

709. Let *L* = lodger, *V* = having a vote, *F* = been forgotten.

Then the conclusion is *V e F*, and the given premise is *L a V*.

(1) Taking this as the minor premise, and supplying as major premise 'No lodger has been forgotten,' we get

$$\begin{array}{c} L e F \\ L a V \\ \hline \therefore V e F \end{array}$$

which involves illicit minor.

(2) As V is distributed in the conclusion but not in the premise, this argument cannot be made correct directly or by use of the ordinary four forms of proposition. But, taking the obverted contrapositive of $L a V$, we get $\bar{V} a \bar{L}$. Adopting this as major premise, we want as conclusion $F a \bar{V}$, which is the obverted converse of $V e F$, and has suffered no change of quality. To obtain this both F and \bar{L} must be distributed in the minor premise, which must be universal, and must therefore be a U proposition (vol. i., p. 200); we then get

$$\begin{array}{c} \bar{V} a \bar{L} \\ F u \bar{L} \\ \hline \therefore F a \bar{V} = F e V = V e F. \end{array}$$

(3) If we supply $L e F$ as the minor premise, and take $L a V$ as the major, and get as conclusion $F e V$, the simple converse of $V e F$, the syllogism has been made to involve illicit major

710. Let T = tradesman; E = English; R = rated; \bar{R} = not rated; D = Dissenter.

Then the premises are:—

- (i) $T a E$.
- (ii) $R T a D$.
- (iii) $\bar{R} T e D$.
- (iv) $D a T$.

(1) Combining (i) and (iv) we get $D a E$.

If we assume $T = T R$, i.e., $T a R$ = every trader is rated, and $E a T$ = every Englishman is a trader, we get $E a R$, i.e., every Englishman is rated.

But neither of these assumptions is justified by the given statement.

(2) The converse of (iii) is $D e \bar{R} T$,
and (iv) „ $D a T$.

∴ if $R T = T$, i.e., if no tradesman is rated, these are incom-

patible predicates simultaneously affirmed of the same subject, and to thus predicate is to deny the existence of the subject. Hence, in denying the existence there of dissenters, the unjustified assumption is made that no tradesmen are rated.

711. Let C = citizen ; V = voter ; H = householder ; L = lodger ; \bar{V} = non-voter ; \bar{H} = non-householder ; \bar{L} = non-lodger.

Then the first statement is—

No C is either VHL or $\bar{V}\bar{H}\bar{L}$.

Obverting this (cf. vol. i., p. 274), we get—

Every C is either V or H or L , and is also either V or \bar{H} or \bar{L} .

Combining these we get—

Every C is either $V\bar{H}$ or $V\bar{L}$ or $H\bar{V}$ or $H\bar{L}$ or $L\bar{V}$ or $L\bar{H}$;

But, by law of excluded middle, $V\bar{L}$ is either $V\bar{L}H$ or $V\bar{L}\bar{H}$;

$\therefore V\bar{L}$ is included under $H\bar{L}$ or $V\bar{H}$, and need not, therefore, be separately stated.

Similarly, $H\bar{V}$ is included under $H\bar{L}$ and $L\bar{V}$,

and $L\bar{H}$ „ „ $V\bar{H}$ „ $L\bar{V}$;

\therefore the disjunctive simplifies to—

Every C is either VH or $H\bar{L}$ or $L\bar{V}$.

And this is the second statement, which is thus seen to be the obverse of the first.

Or, starting from the second statement, we get by obversion—

No C is at once \bar{V} or H , \bar{H} or L , \bar{L} or V ,

i.e. (by combining the first two disjunctions)—

No C is $\bar{V}\bar{H}$ or $\bar{V}L$ or HL , and at same time \bar{L} or V .

\therefore (combining)

No C is $V\bar{H}\bar{L}$ or VHL ,

which is the first statement.

These are, therefore, seen to be exactly equivalent, as they are mutually inferrible from each other. (See Keynes, *Formal Logic*, pp. 410–11.)

712. (a) Let S = schoolboy ; C = capable of understanding Constitutional History ; D = able to remember dates.

Then the argument is—

$$\begin{array}{c} S e C \\ D a S \\ \hline \therefore D e C \end{array}$$

and this is the conclusion given, which is, therefore, valid, the argument being a syllogism in mood **E A E**, in Fig I. (*Celarent*).

(b) This is best stated as a pure hypothetical syllogism (Fig. I.)—

If not healthy, then always miserable,
 If wealthy, sometimes not healthy;
 If wealthy, then always miserable.

This is invalid as the premises only justify the particular conclusion, 'If wealthy, then sometimes miserable.' The fallacy corresponds to Illicit Minor, as is evident when the syllogism is stated categorically—

$$\begin{array}{l} \bar{H} a M \\ W i \bar{H} \text{ (obverse of } W o H) \\ \hline W a M \end{array}$$

The fallacy is based on ambiguity of language, 'not to be healthy' in the first sentence being made equivalent to 'to be unhealthy,' which is its force in the second sentence.

(c) Vol. ii., pp. 242-3, 247.

713. See pp. 254-5. Vol. i., p. 233.

The conclusion given does not follow from the premise: the obverse of which is, 'No men are not rightfully entitled to the produce of their labour'—a very different proposition from 'No man is entitled to anything but the produce of his labour.'

714. Vol. ii, pp. 232-3.

(a) Vol. ii, pp. 272-3.

(b) *A dicto secundum quid ad dict. simp.* It is assumed that the advice can have no effect on the conduct, whereas it may entirely change it; cf. vol. i., p. 386, and Answer to Question 605.

715. Stated syllogistically—

If he is innocent he should not be punished,
 He should not be punished;

 ∴ He is innocent.

This is vitiated by the fallacy of affirming the consequent. See vol. i., pp. 363-4.

716. This commits the fallacy *a dicto secundum quid ad dictum simpliciter*, the *secundum quid* being the time at which the man 'eats most,' which is taken generally in the conclusion, but specifically in the major premise. The conclusion which can be

drawn is 'He who has been eating least is he who will eat most if he gets the chance.' The ambiguous form of the given conclusion suggests that the meaning is that at the very time when eating least a man eats most; *cf.* vol. ii, pp. 243-6.

717. (a) The question is whether the major premise demanded — 'Some non-effective measures are justifiable' — is sufficient, when joined to the accepted minor premise 'No persecution has been effective,' to prove the conclusion 'Persecution is justifiable.' Let P = persecution, J = justifiable, E = effective. Taking the obverse of the accepted minor premise we have $P a \bar{E}$, which gives us a true middle term, then

$$\begin{array}{c} E i J \\ P a \bar{E} \\ \hline \therefore P i J \end{array}$$

This is invalid, as the middle term (\bar{E}) is undistributed. The major required is $\bar{E} a J$:—*i.e.*, all non-effective measures are justifiable.'

(b) This is valid, and is best stated in a mixed hypothetical syllogism—

If a deed is unstamped it may be genuine,
This deed is unstamped;
 \therefore This unstamped deed may be genuine.

Cf. vol. i., p. 365; and for form of major premise *see ib.*, p. 186.

718. This is a simple constructive dilemma containing the fallacy *a dicto secundum quid ad dict. simp.* (*cf.* Answer to Question 605). Its invalidity is shown by the fact that it may be rebutted by taking as major premise: "If we are to die it is not better to be few as we shall not be alive to share any glory; and if we are to live it is not better to be few, as our country will not lose any citizens." The fallacy lies in assuming that the dying or living is independent of the number of men.

719. This is an inductive inference. There are two hypotheses, and an attempt to decide between them by a crucial experiment (*cf.* vol. ii., pp. 102-4). The crucial experiment is of a negative character, in that the influence of the exhalations from the land is excluded by getting far enough away from the land (*cf. ib.*, pp. 118-20). Variation of distance from land is an attempt to prove

variation in danger of infection concurrent with variation in nearness of land (*cf. ib.*, pp. 117-8, 114). But the connexion of the miasma with fever cannot be fully established without such an analysis of miasma as will show it to contain germs capable of producing fever; experiments with these germs on animal organisms are necessary to fully establish this. The mere coincidence of fever with breathing miasma cannot give absolute theoretical certainty.

720. The amusing *tour de force* of Sydney Smith from which these extracts are taken contains in almost every line an *ignoratio elenchi* (see vol. ii., pp. 285-90), with an occasional *petitio principii* (*ib.*, pp. 279-85). Every possible form of *ignoratio* is exemplified here; the ground of opposition is continually changed; the arguments in one place are destructive of those used in another. We have *petitio principii* in the disclaimer of illiberality, as well as a contradiction of the remarks immediately precedent. The student will do well to pick out, classify, and get to the bottom of every fallacy in such a passage.

Of fallacies of this kind Bentham sums up the following common characteristics—

(1) "Whatsoever be the measure in hand, they are, with relation to it, irrelevant.

(2) "They are all of them such that the application of these irrelevant arguments affords a presumption either of the weakness or total absence of relevant arguments on the side on which they are employed.

(3) "To any good purpose they are all of them unnecessary.

(4) "They are all of them not only capable of being applied, but actually in the habit of being applied, and with advantage, to bad purposes: viz., to the obstruction and defeat of all such measures as have for their object and their tendency the removal of the abuses or other imperfections still discernible in the frame and practice of the government.

(5) "By means of their irrelevancy, they all of them consume and misapply time, thereby obstructing the course and retarding the progress of all necessary and useful business.

(6) "By that irritative quality which, in virtue of their irrelevancy, with the improbity or weakness of which it is indicative, they possess, all of them, in a degree more or less considerable, but, in a more particular degree such of them as consist in

personalities, they are productive of ill-humour, which, in some instances, has been productive of bloodshed, and is continually productive as above, of waste of time and hindrance of business.

(7) "On the part of those who, whether in spoken or written discourses, give utterance to them, they are indicative either of improbity or intellectual weakness, or of a contempt for the understandings of those on whose minds they are destined to operate.

(8) "On the part of those on whom they operate, they are indicative of intellectual weakness; and on the part of those in and by whom they are pretended to operate, they are indicative of improbity, viz., in the shape of insincerity.

"The practical conclusion is that, in proportion as the acceptance and thence the utterance of them can be prevented, the understanding of the public will be strengthened, the morals of the public will be purified, and the practice of government improved" (*Book of Fallacies*, pp. 359-60).

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